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JUNE 13TH, 1893.

J. G. GARSON, Esq., M.D., *Vice-President, in the Chair.*

The Minutes of the last Meeting were read and signed.

The presents that had been received were announced, and thanks voted to the respective donors.

The election of CHARLES HOSE, Esq., Resident of the Baram, Sarawak, was announced, also of ALFRED PARMINTER, Esq., of Evesham, Worcester.

Dr. F. WARNER read a paper on "Deviations from the Normal among 50,000 Children."

Mr. A. L. LEWIS, Dr. L. ROBINSON, Sir H. HOWORTH, and Mr. R. PYE joined in the discussion, and the author replied.

A paper on the "Developmental Aspects of Criminal Anthropology," by Dr. CLOUSTON, was read.

Mr. OSBERT H. HOWARTH read a paper on the "Rock Inscriptions of Sinaloa," and exhibited some pottery and crania from a tomb recently opened at Xico.

Miss BUCKLAND, Mr. GOH, Mr. BALFOUR, Mr. LEWIS, Mr. PYE, Dr. GARSON, and Sir H. HOWORTH took part in the discussion.

A paper on the "Use of Narcotics by the Nicobar Islanders," by Mr. E. H. MAN, was read.

DEVIATIONS *from* NORMAL DEVELOPMENT *among* 50,000 CHILDREN. By Dr. FRANCIS WARNER, F.R.C.P.

ANTHROPOLOGICAL research has often been directed to the determination of the average growth of man in a certain class, and as a means of defining the highest types among them; this enquiry[1] was undertaken to determine the probable amount of defectiveness—or deviation from the average below the normal—in the child population, its distribution and classification, and, if possible, its significance and causation. Notes were taken only of deviations from the normal believed to be lower than the average, *i.e.*, the abnormal.

The children were seen in schools, and were each inspected by me as they stood in rank; for each case presenting any defect of body or visible defect in the nerve-system, a schedule was filled in recording particulars as to (1) Physiognomy and Development, (2) Nerve-signs indicating defective or disordered nerve-conditions, (3) Physical health and nutrition, (4) Report of teachers as to the child's work or character in school. The children presenting no visible abnormal points, and not reported as dull by the teachers, were dismissed.

A full report of the 9,186 children (Boys, 5,579; Girls, 3,607) among 50,027 (Boys, 26,884; Girls, 23,143) of whom notes were registered in schedules, has been prepared and presented to the Local Government Board. This method of inspection, as compared with the possibilities of accurate study in the laboratory, is of course somewhat incomplete, but the co-related description of Development, Nerve-state, Physical condition, and the teacher's report of each case will, I think, be found to give new information, and afford some fresh evidence as to the significance and causation of deviation from the normal type of child.

We have before us many records of the types of defect seen in the prison and the asylum, with a statement as to the frequency of individuals presenting similar conditions among the population at large, and conditions co-related. These defects among children in schools were similar in the maldevelopments seen in asylums, but usually less in degree.

Most of the signs of nerve-defect or disorder are those which I described for this purpose many years ago; their frequency and significance are now demonstrated by report and analysis.[2]

[1] This enquiry was promoted by a Joint Committee of the British Medical Association and the Charity Organisation Society.

[2] See "Mental Faculty," Cambridge University Press.

I propose in this paper to deal mainly with defects in development or proportioning in the parts of the body; a list of these points is appended giving numbers of cases seen with conditions co-related. See Table I.

All defects—with one or two exceptions—are much more frequent among boys than girls, and all are co-related with a tendency to "low nutrition," "abnormal nerve-signs," "mental dulness," but in a varying degree; it has been shown that the environment affects materially the degree of such co-relation. In the latter fact we see a practical application of the knowledge obtained by enquiry.

Cranial abnormalities form the largest group, with the highest co-relation with other defects. The group is divided into nine classes, and in each class the proportion of boys to girls is large except for "Small Heads," in which for girls the percentage upon the population is 3·2 and for boys 1·2.

Girls, when defective, are more susceptible to the environment than boys, and taking three districts in London we find the percentage of girls with small heads is, for Strand 7·0, City 6·1, Bethnal Green ·4. I cannot but think that the neighbourhood of large block buildings may be a cause of the small crania. The large heads, bosses on cranium and some other conditions, appear to be largely due to antecedent rickets.

Bosses or outgrowths in the bone are common at the site of the ossific centres of the frontal bones; usually symmetrical they often protrude considerably and strain the skin over them, so that it is frequently cut and scarred. These bosses are, however, not always symmetrical, which is one of the causes of asymmetry of the forehead; most commonly the right frontal bone develops a boss and is somewhat more prominent than the left. The whole frontal bone may be small, narrow or shallow in the vertical direction, on the other hand it may be wide and overhanging, this I think less common. I have not analysed these conditions of the forehead. A vertical frontal ridge, due to over ossification of the interparietal suture, is met with in all degrees; alone I do not know that it is important, but it may be so pronounced as to cause injury in falls, and I have seen scars over it. Accompanied by a small head and narrow forehead it forms the keeled or scaphocephalic head, well known among microcephalics, where the interparietal suture may be ridged also.

Five hydro-cephalic boys and two girls were found. Other types of cranium—such as the square, flat, and conical—were met with. The dolicho-cephalics were 43 among boys, 6 among girls, and appeared to me to be hardly abnormalities, usually being bright children.

Palate defective is only second in importance to the cranium. The palate is inspected in each child; this appears to be of essential importance, the co-relations being only slightly lower than with cranial defects. It is shown that the palate and cranium were both defective in 277 children. There were 22 cleft palates; other types are enumerated.

The external ear was frequently defective among boys. Usually the defect is similar on both sides but by no means universally. It may be abnormal in size; more important is defect in proportioning of its parts. The most important defects are absence or low formation of parts, such as the helix, and specially the antehelix, which produces an ear convex on posterior surface, cavelike in front standing out from the cranium; such ears are usually cold and blue, with slight varicosities, the skin being coarse and tightly stretched and liable to chilblain. I did not see any reason to regard the adherent lobe as very important, and do not think that arrangements of the hat in infancy have anything to do with these ill-developed, mal-proportioned ears. The condition is present more or less in seven times as many boys as girls.

Epicanthis.—A fold of skin developed across the inner angle of the opening of the eyelids is abnormal in the English race, its importance when taken alone appears very small, but in 90 children in whom it was present with cranial defect the co-related defectiveness was very high. The epicanthis appears in many children to be a temporary defect, and like depression of the nasal bones—or want of due proportional growth—to be a mal-proportion often outgrown in adolescence.

Minor conditions of defect have as a matter of convenience been grouped as "Other defects in development."

Children short or small for their age. Children were so registered whether well proportioned or not; many of these were small headed also, in which cases they were entered for the two defects as under "Cranium" and "Other defect." A small child with a well made fairly large cranium is better off than the child small in growth and with a small head, which is then more likely to be thin and dull. The nasal bones may be wide and bridge of nose sunken, as in babyhood. In some of these cases the bones appear too wide and flat, in other cases I believe it is simply an example of the ratios of infantile growth too long maintained; the proportion of boys and girls is very nearly equal.

The facial openings for eyes and mouth may be too small: I did not meet with examples of a large mouth in the schools. The palpebral fissures in the normal have their transverse axes horizontal, but they may slope downwards or upwards. The

face presents a peculiar appearance when of normal size with these openings small, a large area of featureless skin.

The forehead may be hairy, the scalp nearly joining the eyebrows at their outer margin, or its whole surface covered with fine down; usually the forehead itself is then also narrow and shallow. The face (facial bones) may be small together with the upper and lower jaw under a well made calvarium, giving the appearance of delicacy and feebleness. The soft tissue, skin and subcutaneous tissue over the bridge of the nose may be superabundant and wide, so that it feels thick when picked up with the fingers; this tends to give greater width between the eye openings. I imagine that morphologically it is associated with the epicanthis, which is often developed at the same time.

Large frontal veins, and large veins across the nose connecting the orbital veins, appeared noteworthy; they are often seen in hydrocephalus and other diseased conditions.

The prognathous type was noted in 22 cases, all boys. "Hands cold and blue" was noted, as independent of the time of year the condition is common with low development, and is usually present on one side in hemiplegic children. Ichthyosis, hare-lip, and congenital cripples were described. Supernumerary ears (in boys 7, girls 3) were represented by a papillary outgrowth in front of the tragus, sometimes nearly half an inch long and pedunculated. Occasionally there was more than one such outgrowth—I have seen three; they may be on one or on both sides: usually the ear with such appendages was well made. Branchial clefts were occasionally represented by small puncta at upper root of the helix. In three or four cases the concha was almost absent and represented by a cartilaginous outgrowth.

We may now consider the whole group of 5,851 children registered as presenting one or more of the defects referred to—these are here termed generically "Development cases." It will be a matter of interest to collect evidence as to the significance of these mal-developments, many of them slight in degree, and see if they are of any importance to the individual case or to groups of children. Are they degenerations, reversions to types common or normal in the earlier states of man, or examples of non-evolution of a uniform type in the species? The evolution of the features of man during historic periods may in part be traced from writings, also from records in marble and bronze, drawings on vases, coins and ornaments, &c. All the types of defect are seen to-day among idiots; the degree of these defects is greater among imbeciles than when the same type of defect is seen in school children. We may then judge of the amount or degree of defectiveness indicated by a condition of defect

in the body in various ways:—(1) The degree of mal-proportioning of a part, or the number of mal-proportions in it. (2) The number of parts of the body mal-proportioned. (3) The co-relations of each defect with "Low nutrition," "Abnormal nerve-signs," "Mental dulness."

Of the whole group of "Development cases" the largest proportion falls upon the boys. All these children tend to a condition of "Low nutrition" specially under conditions of home and day school life; they tend also to conditions of defect or disorder of the nerve-system, indicated by abnormal nerve-signs (or improper ratios in action of nerve-centres) and to "Mental dulness." These statements are evidenced as to the 5,851 "Development cases" and as to individual defects in the columns of Table II.

Probably some defects in development are due to the non-evolution of a perfectly uniform type in the species; this seems to be indicated by comparison of facts seen among English, Irish and Jewish children, in whom the normal type was found in 89·2 per cent. of the English, 92·5 per cent. of the Jews, and in 80 per cent. of the Irish. The Jewish children were those in the Free Schools, Whitechapel, and the Irish children were mostly near London. On the other hand defects appear to be in part due to the present environment of groups and classes of the population (removable causes).

The percentage of "development cases" is higher in schools of upper social class than among the poorer schools in every particular except "small head" and "small growth," conditions that I have dealt with elsewhere. It must be remembered that in this enquiry conditions below the average were alone recorded, so that my results do not present the average of the class, but the proportion of defectiveness; the same remark applies to questions of nationality. It seems possible that the surroundings in certain localities may have something to do with conditions of development; for this purpose I have prepared a table showing conditions of development among 34,991 children living in 20 districts in and near London. The numbers of children seen are perhaps too small for the formation of any strong opinion upon an important problem, but as there shown the conditions varied greatly.

It seems probable that there is much spontaneity in the proportional growth of children which may be largely controlled by the physical environment. Certainly this is the case as regards their nerve-system; in the infant school spontaneous movement (spontaneity of nerve-centres or "Microkinesis")[1] but little controlled by surroundings is the rule, so that fixed balances,

[1] See article in "Dictionary of Mental Science."

TABLE I.—DEVELOPMENT DEFECTS FOUND AMONG 50,027 CHILDREN (BOYS, 26,884; GIRLS, 23,143).

	No. of Cases.		Nerve-Signs.		Nutrition low.		Dull.	
	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.
Cranial abnormalities	1,528	1,148	850	531	392	480	634	477
Head small..	327	738	177	372	151	399	165	353
„ large..	257	46						
Bosses on cranium..	495	127						
Forehead narrow or defective	183	78						
Frontal ridge	89	27						
Head asymmetrical	84	16	40	7	18	3	35	6
Dolicho-cephalic	43	6						
Hydrocephalus	5	2						
Other cranial types	45	4						
Palate defective	796	535	441	262	173	155	324	232
Palate narrow	450	291						
„ V-shaped	235	171						
„ arched or vaulted	86	41						
„ other types..	10	15						
„ cleft..	14	8						
External ear defect	1,047	268	566	128	196	72	340	103
Epicanthis	514	384	227	160	65	73	192	136
Other defects in development	908	645	555	355	189	172	383	263
Children small for age	209	209	119	110	88	101	78	79
Nasal bones thick or sunken	241	214	131	95	16	19	87	77
Features coarse or large	147	104	112	68	19	17	73	43
Palpebral fissures small	98	83	61	57	22	16	41	39

TABLE I.—DEVELOPMENT DEFECTS, &c.—continued.

	No. of Cases.		Nerve-Signs.		Nutrition low.		Dull.	
	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.	Boys.	Girls.
Other defects in development—continued.								
Mouth small	27	17	16	10	8	2	8	10
Forehead hairy	40	3						
Face small	18	11						
Bridge of nose in its soft tissue wide	33	28						
Adipose type	16	9						
Frontal veins large	13	6						
Hands blue and cold	17	11						
Prognathous type	22	0						
Ichthyosis	10	7						
Hare lip	10	5						
Congenital cripples	7	9						
"Development cases"	3,616	2,235	1,975	1,096	733	726	1,398	928
Cases of Binary defects in development	1,240	683	798	362	325	273	592	287
Cranial and "other defect"	281	219	191	121	94	95	140	95
Cranium and palate	153	124	135	64	64	57	114	56
Cranium and ear	194	44	116	18	48	22	68	19
Palate and "other defect"	142	73	88	33	34	18	74	30
Palate and ear	103	17	56	9	15	10	41	5
Palate and Epicanthis	41	33	15	18	8	8	13	13
Epicanthis and "other defect"	100	73	52	35	13	14	41	25
Epicanthis and ear	74	29	32	16	11	12	21	11
Epicanthis and cranium	46	44	41	35	18	28	37	22
Ear and "other defect"	106	27	72	13	20	9	43	11

attitudes, or postures, and average movements are not commonly seen among very young children, while in the upper standards all action is well controlled and brought up to a normal average by discipline through the eye and the ear. The problem remains why "abnormality" is so much more common with boys than girls; some facts bearing on the question seem to be proven. Defects are more common with boys than girls, but when defective in development, girls suffer most from "low nutrition" and "mental dulness," while abnormal nerve-signs are most marked among the ill-developed boys. This is seen in contrasting "development cases" in resident schools with those at home and day school, the residence increases nutrition most with the girls and the nerve-signs most with the boys. It may be that there is more spontaneity both of growth and nerve-cell action among girls than boys, and therefore more need of due impression by the environment to co-ordinate it to a normal average.

The co-relations of defective development as well as its greater frequency among boys, become accentuated when we consider cases presenting combinations of two defects, as shown in Table I.

The most frequent and nearly the most important combination is that of "Cranium and palate defective" (boys 135, girls 64), and then in order of frequency "Cranium and Ear," "Palate and Ear," "Cranium and Epicanthis," "Epicanthis and Ear," "Palate and Epicanthis."

It is in terms implying combined conditions that groups of children may best be defined and enumerated in a scientific report, while analysis of the relations of individual defects may afford the best evidence as to their causation.

If we take the percentage co-relation with mental dulness as the standard of the defectiveness of the respective groups they may be arranged thus:—

TABLE II.—CONDITIONS CO-RELATED WITH MENTAL DULNESS.

	Percentage reported dull.		
	Boys.	Girls.	Total.
50,000 children seen	8·2	6·3	7·0
Development cases	38·6	41·5	39·7
" " with abnormal nerve-signs ..	43·2	43·3	43·3
" " without nerve-signs	32·9	38·7	35·3
" " with low nutrition	39·7	39·9	39·8
" " " " and nerve-signs	46·6	41·2	44·0

I do not wish to weary you with many figures, and will conclude with a slight reference to a group of children who appear to require special care and training numbering 817, or 16 per 1,000 upon the number seen. This includes epileptics, children defective in mental status, cripples, and children who presented defects in development with low nutrition and abnormal nerve-signs and were reported as dull in school.

A large amount of detailed information will be found in a statistical report on this investigation which has been published. An extended investigation is needed to elucidate many points here touched upon, and this work has been undertaken by a Committee appointed by the International Congress of Hygiene and Demography.

DISCUSSION.

Mr. LEWIS said he was glad, as an inhabitant of Islington, to find that parish presenting the best health average in the metropolis, notwithstanding that the two schools from which the children appeared mostly to have been selected had both, if he was not mistaken, been considered somewhat unhealthy. The children stated to belong to the City would appear to come from the outer edges of the City territory, and those said to belong to the Strand seemed to come from Seven Dials and other parts where there was no doubt much crowding, although the buildings were not so high as those in the better parts of the City and Strand districts. Some districts where crowding would not be expected (such as Croydon) appeared, however, to show a bad average. The subject was one of great difficulty but also of great practical importance, and he hoped Dr. Warner would continue his investigations into it.

Dr. ROBINSON: In the case of younger children than those dealt with in Dr. Warner's most interesting paper, I have noticed that there is a great difference in development between different children of the same age. This is markedly seen in the cutting of the teeth, and in the closing of the anterior fontanelle. I have also observed it in the growth of the limbs and in the changes taking place in the normal curves of the spine in children under three years old. These variations are usually not dependent upon environment but are hereditary. It seems, therefore, that some of the cases of defective development noticed by Dr. Warner are merely cases of delayed development depending upon idiosyncrasy. It appears to me difficult to fix a standard of normality in such organs as the ear. The ears of different children vary greatly just as do their eyes and other features, yet nearly all types may be said to be normal.

Dr. WARNER: In forming a judgment upon the abnormality or defectiveness of a cranium or feature of the body, the observer should be well accustomed to describing the normal, and must

compare the part with the normal as to size, general form, and absence of ill-proportioning of its parts. Thus: in the forehead compare its width, height, and inclination with the normal; if they be present, describe median ridge or lateral bosses—in the ear note as to their proportions the helix, antehelix, pinna, and lobe, and the texture of the cutaneous covering. As to size of the head, the standard used is to compare the head with the normal for the age, independent of the height of the child; thus a "small child" with "small head" is noted for each defect. Another mode of determining the "defectiveness" of a form of palate, ear, &c., is suggested by a table published in the report on 50,000 children where the percentage co-relation of each defect with "low nutrition," nerve disorder, and mental dulness indicates the defects in development most uniformly associated with other modes of abnormality. Thus it appears that small-headed children are at a great disadvantage in the struggle for existence, as they are very frequently delicate with nerve-disturbance and mental dulness; an ill-formed ear is a defect of less degree. Dr. Warner expressed the opinion that some so-called defects in development are reversions, sometimes even temporary in the individual as in the epicanthis which may be out-grown, while others may possibly be due in part to the conditions of the environment, markedly so when due to rickets. The distribution of defects in districts of the metropolis was presented rather as an indication as to how the investigation might be conducted than as a statement of ascertained conditions in the localities named, the work done at present being insufficient to determine so important a question. The inquiry is being actively prosecuted by a Committee appointed by the International Congress of Hygiene and Demography.

The Developmental Aspects *of* Criminal Anthropology.

By T. S. Clouston, M.D.

The criminal has not been studied in this country on scientific lines as he has been of late years in Italy, France and Germany. Yet three Scotsmen, Dr. J. Bruce Thomson, surgeon to Perth prison, Dr. David Nicolson, now Superintendent of the Criminal Lunatic Asylum at Broadmoor, and Dr. W. Wilson, were early in this field and did good preliminary work, apprehending the general principles that should guide investigators. Lately we have had from Dr. Ireland[1] vivid delineations of the mental and bodily peculiarities of some great criminals. Like a true scientific man and literary artist combined, he studies together

[1] Dr. Ireland: "The Blot upon the Brain," and "The Ivory Gate."

criminals, emperors and saints, subjecting them all to the same psychological analysis and the same anthropological tests. Dr. Bruce Thomson, in 1870, had come to the conclusion that "criminals form a variety of the human family quite distinct from civil and social men. There is a low type of physique, indicating a deteriorated character which gives a family likeness to them all," and he quotes with approval a friend's dictum that "the thief appears to me to be just as completely marked off from honest working people as black-faced sheep are from other breeds."[1]

He looked on criminality as being so "allied to insanity as to be chiefly a psychological study." He directed attention to the ugliness and deformities of criminals, their under size and weight, and other evidences of degeneration; to their great liability to diseases, especially to epilepsy, insanity, and brain disease, 12½ per cent. of the whole falling into these; to the shortness of their lives, and to their many psychological peculiarities. He pointed out their frequent heredity to insanity, to habitual drunkenness, and to consumption as well as to many other bodily diseases. Finally he insisted on the fixity of all their peculiarities, so that by their incurability they proved the difference between them and ordinary mankind. As Havelock Ellis says, Thomson's papers "gave a stimulus to the study of the criminal throughout Europe." Despine in France had somewhat preceded Thomson in the same field. Dr. G. Wilson at the Exeter meeting of the British Association in 1869 read a paper on "The Moral Imbecility of Habitual Criminals as exemplified by Cranial Measurement." He had measured the heads of 464 criminals, finding their average size less than that of the ordinary population, and coming to the conclusion that "the cranial deficiency is associated with real physical deterioration." Subsequently to these writers, Maudsley by his eloquent and forcible style, diffused a keener and a wider interest in the whole subject, especially among lawyers and medical men.

Since that time criminal anthropology has assumed a name and attained an importance unknown before. It fascinated Lombroso, an Italian man of genius, and through him has infected the minds of able observers in Italy and elsewhere. As Havelock Ellis says, "Lombroso first perceived the criminal as anatomicaliy and physiologically an organic anomaly. He set about weighing him, and measuring him according to the methods of anthropology. Even on the psychological side he gained new and more exact results." A Criminal Anthropological Congress was held in Paris in 1885, and other Congresses have followed. The new branch of science has journals

[1] "Journ. Ment. Science," October, 1870.

and archives devoted to its advancement. But the history, the progress, and the results of the study of criminal anthropology up to 1890 are all so admirably told by Mr. Havelock Ellis in "The Criminal," that I need only refer to that fascinating work. Few who begin to read it will lay it down again till it is finished. By its means I fully expect that the reproach of ignorance and carelessness in regard to the subject will soon be wiped out in our country; for it will certainly rouse some of our younger men to take it up. For myself, I feel it is somewhat of an impertinence to bring forward a paper on this subject at all. My excuse must be that I do so "by request," and that some recent studies of mine in regard to the nervous diseases that are apt to arise during the development of the human organism seem to have a possible relationship to one aspect of criminal anthropology. I have often directed the attention of my students and assistants to the great interest and importance of the subject; and I think the time is very near when some knowledge of it will be required of all medical men, and especially of all lawyers and the higher officials of our prisons. I trust that very soon too Bruce Thomson, Wilson and Nicolson, will have Scottish successors among its original investigators and expositors.

It is quite clear at the outset that every student of criminal anthropology must have ever before him the three great factors of:—1st, the heredity of the criminal; 2nd, his brain with its reactive and resistive qualities that may be entirely different in each case; and 3rd, his environment, with its permanent and its immediate effects. Under the heredity must be taken into account the effects of hereditary diseases, especially nervous diseases in past generations, and the fact of their possible transmutation into other diseases in offspring; the effects of privation and innutrition, of lawlessness, of hard struggles for life, of ancestral instabilities of all kinds, and of a-social conditions: while atavism and reversions of many sorts may be the key to the problem in any individual case or family. Under the brain and its essential qualities there must be considered its receptive and its reactive power, but especially its inhibitory power against pain, against "temptation," and against temporarily agreeable and disagreeable things generally. The sensibility of the organ, mentally and bodily, to pleasurable and painful impressions; and whether it is especially explosive in its mode of working; the strength of the organic cravings for food, for stimulants, for excitement, and for sexual gratification; its educability, its imitative qualities, its intellectual force, and the vividness of its power of imagination, representation and reminiscence, are all most important to be

kept in mind; as are also the moral sense and the qualities of the brain that are the basis of it; the power and natural desire to love, imitate, and admire the good, to hate the evil, to be sorry for lapses from right, and the natural strength of the social instincts in the organ.

The environment must begin with the daily life and surroundings in youth, and must go on to the education, moral and intellectual; the social, physical, and moral atmosphere breathed in youth; the motives towards good or evil presented, and how presented; the constant example of friends and companions; the direct moral and religious precepts and examples.

Those portions of the brain cortex which have mentalization as their function are unquestionably the examples of the highest evolution of organised matter to be found in nature, the fullest of hereditary qualities, the most powerful, yet the most unstable, and by far the most physiologically valuable part of man. They undoubtedly must be regarded as the vehicle of the goodness of the saint and of the badness of the criminal. Almost all the questions that arise in the study of the criminal, according to the modern school, come to these—"Have we among us men and women whose mental cortex is of such quality that in ordinary environment their conduct must necessarily be antisocial and lawless?" And if so, "what anatomical, physiological, and psychological signs are there to distinguish this criminal and his cortex?" If there are no such signs then there is no such branch of science as criminal anthropology. It will not do to say that the sole tests are the social conditions under which the criminal lives; the thing to be tested is his mental cortex, and its reaction is his lawlessness. Lombroso, Benedikt and the whole of that school say that there are tests by which the criminal may be known; that he is a criminal, potentially, long before he is one actually. Our British laws virtually deny this, and of course take no measures to meet it. There are certain kinds of criminals, the political, the occasional, the passionate, the socially high placed cheat and swindler, who are admitted by even the most enthusiastic criminologists to be indistinguishable as yet by anatomical or other signs. It is only the criminal by habit and repute, the men and women of ever recurring convictions, and the criminal who becomes so early in life, and remains so, that we practically have to do with for purposes of scientific study.

It is not my purpose in this paper to attempt to summarise the numerous and most interesting facts that have been adduced by Lombroso, Marro, Ferri, Krafft-Ebing, Broca, Benedikt and many others as to the size and shape and development of the criminal's brain, his physiognomy, his ear, his eye, and his body. One conclusion is forced on me after reading the evidence on

these points. If there is no absolutely marked criminal type that all will agree on, there can be no doubt that criminals fall far below a high or ideal anatomical and physiological standard of brain, and body and mind. All investigators are at one on this point. The weak point in criminal anthropology, it seems to me, is that while criminals have been weighed and measured, observed and described, the classes of society from which most of them come, but who have not been convicted of breaking the law, have not been observed in the same way, and the same scientific tests have not been applied to them. *A priori* there would be little use in gauging the criminal by the standard of the well-fed, the respectable and the comfortably-off classes of society. The really scientific method would be to apply the tests to whole sections of the lower labouring classes of society including the criminals. As yet, to a certain extent, criminal anthropology has been in the hands of the enthusiasts, many of whom have been fascinated by its scientific and social interest, and have seen perhaps both more and less than the men of cooler judgment who will follow them. We all know that nothing in science was seen till it was looked for, but we know also that almost anything may be seen which is expected by an enthusiast.

Looking at the subject from a social point of view there must almost necessarily be a close affinity between the habitual criminal and the habitual idler and ne'er-do-well and the able-bodied pauper. Going lower down there must be a still closer connection between him and the vagrant and the tramp; and the closest of all between him and the prostitute. Up to this there has been no very evident *pathological* nexus. But when one gets to the habitual drunkard, that element comes in along with the environment and heredity. Whatever induces it to begin with, the long continued practice of excess in drinking causes a pathological degeneration in the brain cortex that can be demonstrated by the microscope, this producing a dissolution of mental and moral inhibition, and frequently breaches of the law. There is a large class of human beings whose brains suffer manifestly and admittedly from arrested development—the congenitally imbecile. Imbecility may exist in any and every degree, and may extend to any and every mental and moral faculty. A complete idiot seems to have little connection with a criminal, but a man or a woman who is only slightly imbecile in mind has many anatomical, physiological, and psychological resemblances to him. The two conditions unquestionably overlap and intermix. Then, last of all, epilepsy and typical insanity result from a pathological change in the brain cortex, and are diseases just as much as rheumatism is a disease. Yet being diseases of the mind organ, human conduct is involved in

them, and their effects are nearly always antisocial and often lead to vice, lawlessness, and criminality. Attacks of these diseases often cause permanent damage to the brain cortex, so that afterwards the subjects of them, who have before been law-abiding men and women, become addicted to crime. A man may "recover" from attacks of epilepsy and insanity so that he is not legally insane, and he may take his place in society; yet after his attacks he may, as the result of his brain damage, become addicted to habitual drunkenness, to theft, to sexual crime, or to acts of violence which he had been entirely free from before. Therefore it seems clear that a scientific criminal anthropology which is to cover the whole ground must deal with the idle, the vagrant, the pauper, the prostitute, the drunkard, the imbecile, the epileptic, and the insane, as well as the criminal. The brain and the environment respectively play very different parts in the causation of those conditions. Society has already provided counteractive environments against the conditions of the brain cortex in the case of several of these classes—in the poorhouse, the casual ward, the reformatory, the hospital, and the pauper lunatic asylum. It would follow that if criminal anthropology established physical, hereditary, and psychological bases of much criminality, the State would have to treat many criminals from an entirely different point of view than the punitive methods hitherto applied. Such in fact is the contention of the modern school of that department of study.

Without derogating from the great and arduous labours of the modern anthropologists, any one in my department of medicine, whose daily experience is to see the human intellect and emotions entirely changed, and human conduct utterly perverted in highly developed and, in some cases, outwardly ideal human beings through subtle nutritional and dynamical changes in the brain cortex that after death exhibits no change of microscopic appearance; such a person with such daily experiences tends to attach less importance to the gross methods of anthropometry, and to visible peculiarities in the brain convolutions. Rather one depends on facial, eye and physiognomical changes and movements, because through those we get into direct contact with the outward expressions of mind. There is no type of criminal physiognomy yet established. One instinctively attaches great importance also to the proofs of diminished sensibility in criminals given by Lombroso, Marro, and Benedikt; above all, one relies on hereditary, developmental, and psychological facts to throw light on the distinctive brain qualities of the criminal. Psychometry, however, will have to be further pursued before we can fully segregate the criminal.

One physiological aspect of the criminal has not, it appears to me, obtained the observation it is worthy of. It may be called the developmental aspect. The term "degeneracy" is in the mouths of all writers on the subject since Morel's great work was written;[1] but it is clear that a degeneracy in a race or family may be a non-development in the individual. Properly speaking, the word degeneracy or degeneration as applied to a tissue or organ in an individual implies that at some former time it had been normal in constitution, like the degenerations of the cerebral cortex in extreme dementia or senility. As frequently applied in criminal anthropology it has not this sense; and when applied in the hereditary sense, it does not convey a correct meaning. It is quite clear that many criminals are so, through the environment having changed in the present generation from that of the former, though their brains are the same as their non-criminal ancestry. We all know that there are districts of the country where there are actually no criminals. It cannot be supposed that there are not in those districts persons with all Lombroso's marks of criminality, and all Benedikt's "atypical confluence" of the brain fissures. We know that when some of the inhabitants of such districts go to live in our great cities they become habitual criminals. We know also that there have been tribes of men who were all reasonably social and none of them criminal before a different race came among them with a different standard of morality and different social conditions, after which they all became drunkards and criminals together.

It seems clear to me that one of the great factors of the causation of criminality is the same as I laid down in 1889 for certain forms of insanity. If the environments and conditions of life were good, and the same in any race from generation to generation, we should have a complete adaptation of the organism to these environments. *The continual process of too sudden adaptation to new environments and new conditions that is going on in our modern life* constitutes in my opinion one of the great causational factors of criminality as I believe it does of certain forms of insanity.[2] In the course of the development of the brain I think it is a certain fact that the later years of adolescence are those in which the great inhibitory, moral, and social faculties that fit men and womenkind to live in a well ordered, modern, civil society, attain such perfection as they are capable of in most men and women. If we take the twelve years between 13 and 25 as the average period of adolescence, it is in the latter six that most criminals develop into that condition. The maximum of

[1] Morel, "Traité des Dégénérescences: Physiques, Intellectuelles et Morales."
[2] "Clinical Lectures on Mental Diseases," by the author, 3 Ed., p. 287.

criminality falls after 25. By far the greater part of the habitual criminals become so in fact before the moral and inhibitory faculties have attained full physiological perfection. The difficulties of earning a livelihood and the antisocial temptations are not then greatest. Yet the habitual thief is then developed. There is only one kind of temptations then strongest and these are connected with the sexual nisus. Looking to the psychological peculiarities of the criminal, it is very striking that they appear in most instances at the age when the moral faculties have not yet attained perfection, but in the normal man and woman are taking a special start in growth. The conclusion seems supported by many facts that most criminals become so at that period through a non-development of cerebral qualities which should then be getting normally strong in normal individuals. Most habitual criminals are never developed intellectually too in any sort of all-round way. Their reasoning power is apt to lack backbone. They stop short at the narrow intellectual range of puberty, not going on to that of full adolescence. A certain arrest occurs before the brain cortex attains its highest qualities, but after the man has attained a sort of legal responsibility. He is not technically imbecile, but such arrested brains, being subjected to the conditions and severe temptations of a highly organised modern city life, cannot exhibit qualities that they do not possess. Their owners to a large extent become the professional criminals and prostitutes of our large cities, and the tramps, idlers, paupers, and stupid unenergetic denizens of our country places. Given this quality of an undeveloped brain in its higher intellectual and moral qualities, the environment then determines the class to which it gravitates. The brain has attained almost its full size and weight, but its cells have not reached perfection in their physiological qualities, notably not in the most valuable quality of all, that of inhibition. It is a striking fact too that the early years of adolescence which immediately succeed puberty, between 13 and 18 years of age, are those in which epilepsy arises in the greatest degree; these six years producing one-third of all the cases of this disease. Now most authors are disposed to attribute epilepsy to a certain kind of diminished inhibition in the motor centres of the brain. Motor centres nearly always precede mental centres in development. The great outward likeness of the epileptic and the criminal brain is one of the most striking of Benedikt's observations.

It is in the later years of adolescence that the peculiar form of insanity incidental to this period of life is most seen, and there occur at this period also a series of lesser mental and moral changes and perversities which are unquestionably allied to criminality in all classes, and often take the form of

criminality in the lower social grades of society. They lie between insanity and criminality. Drunkenness, amounting to uncontrollable craving (dipsomania), is one marked form of this moral disturbance. They consist in some cases of stupidity and lethargy, so that the girl or lad cannot be interested in anything, especially in duty; or they consist in an a-social or antisocial development at this, normally, one of the most social of all ages; or they take the form of a causeless aversion to father, mother, sister, or brother, intolerance of control and utter disregard of duty and the ties of affection; or they take the form of general incompatibility of temper, or of impracticable visionary scheming and want of common sense; or we have sudden immoralities contrary to the bent of the former life; or perverted sexual and reproductive trains of thought dominate the mind and affect the conduct. All these mental and moral symptoms I have seen in the adolescent members of neurotic families, some of whom went through such phases of life and recovered from them as they might do from measles, and they were therefore proved to be pathological. What were "symptoms of disease" to me would certainly have been to the policeman and the magistrate evident proofs of "criminality." What were controlled and cared for in the members of a well-to-do family would probably have been neglected in a poor one. In the one instance the doctor looks after the "case," in the other the policeman locks up the "criminal"; yet they are both equally phases of the same kind of pathological brain development due to hereditary weakness.

There is a curious and in itself an unimportant change in the hard palate, which is found with such frequency in criminals in common with idiots, congenital imbeciles, epileptics, and the adolescent insane, to whom I have just referred, as compared with the general population, that it seems strongly to confirm the theory that certain criminals labour under essential defect of development of brain. As can be readily seen the hard palate has a very close relationship to the base of the anterior lobes of the brain in man. No doubt the base of the skull there follows, and is directly controlled trophically by the development of the brain that it encloses and protects. If the brain base is narrowed laterally so is the skull base, and that would imply a contraction of the hard palate which hangs from it, and is in reality an integral part of it. But why does not the palate arch in that case simply become a narrow arch of the normal form? There are two reasons against this. In the first place the palate is a part of the alimentary system, and follows the development of that rather than the nervous system. Secondly, if the brain base was arrested in growth shortly before or after birth while the palate bones

were growing fast like the rest of the alimentary system, then they would not have room for expansion, and would be thrown into a high vaulted or V-shaped arch. The palate bones continue to grow and develop normally in fact, while the skull base does not expand proportionally. If again the anterior lobes of the brain—and they are in my opinion the chief higher mental centres—do not grow in antero-posterior size, then the palate bones are confined antero-posteriorly, and we have a high deformed arch in that direction.[1] These conditions are found in every degree, shading up into the normal palate arch. I divided the palates I examined into the "Typical," the "Neurotic," and the "Deformed"; and the following table shows the results in the general population, among criminals, in the insane (acquired insanity), in epileptics, in those suffering from adolescent insanity, and in congenital imbeciles and idiots.

FREQUENCY OF THE THREE TYPES OF PALATES IN VARIOUS CLASSES OF PERSONS EXAMINED.

The different Classes of Persons.	No. 1. "Typical" palate.	No. 2. "Neurotic" palate.	No. 3. "Deformed" palate.	Number of Persons examined.
	per cent.	per cent.	per cent.	
The general population	40·5	40·5	19	604
Criminals (the degenerate)	22	43	35	286
The insane (acquired insanity) ..	23	44	33	761
Epileptics	20	43	37	44
Adolescent insanity	12	33	55	171
Idiots and imbeciles (congenital insanity)	11	28	61	169

So far as this indication goes, if indeed it is an indication, many criminals suffer from a developmental brain defect, analogous to that from which we know epileptics, the adolescent insane, and those congenitally weak-minded suffer. I look on adolescent insanity as being clearly a developmental instability due to hereditary weakness. It occurs in greatest frequency during the last stage of development of all, between 22 and 25, the mind cortex being the highest of all, and the last to attain perfection.

I have scarcely touched on the anthropology—using the word in its wide sense of the study of man in structure and function, in body and mind—of the juvenile criminal who becomes so

[1] See diagrams and photographs in "The Neuroses of Development," by the author, pp. 42, 48.

under the age of puberty. He no doubt may be a criminal by environment and by education, just as other children become diligent attenders of church or readers of good books. But there are many cases on record, and I have seen and studied several others, where this explanation will not explain all the facts, and in whom, therefore, I had to assume an original, inherent non-development of inhibition and moral faculty, where crime was truly "instinctive" and normal to the particular individual, and where no responsibility, legal or moral, could be attached to the subjects of these crimes or vices. In such cases morality does not exist because its brain basis does not exist. I have no hesitation in placing in the "developmental" anthropological species of criminals the child in an educated family about whom I am consulted, who at 7 or 8 cannot be made to see the difference between right and wrong, truth and falsehood, who steals, breaks crockery and furniture, tortures and kills animals, has not the elements of the virtues of reverence, respect, and obedience, and does all this surreptitiously and perhaps with cunning, blaming others for his transgressions, and resenting punishment as an injustice. I often see no essential difference between this child and the criminal of 11 or 12 whom I am asked by the Crown agent to visit in prison where he or she lies under the charge of deliberate murder of a little brother, or of setting fire to the house. It scarcely admits of a doubt that criminal anthropology is on a sure basis of physiological fact when it pronounces such a case a criminal through its organisation and not through its environment.

The considerations to which I have directed attention seem to point to two great sources of criminality. First, the not fully evolved man who might do his work well enough in a primitive society, but who cannot accommodate himself to the conditions of a highly organised and largely artificial modern society. Secondly, the non-developed man, whose development has been pathologically arrested towards the end of the period of adolescence, just before the inhibitory and moral faculties had attained normal strength, there being in him often a slight intellectual impairment also.

On the ROCK INSCRIPTIONS *of* SINALOA (*West Coast of Mexico*).

By O. H. HOWARTH, C.E., F.R.G.S.

THE character and surrounding features of the rock inscriptions in the Northern States of the West Coast of Mexico, seem likely to furnish an important link in the problem of the prehistoric

colonization of Central America. So far as I am aware but little attention has yet been attracted to the records of antiquity which exist in these States, owing partly to the fact that they are not distinguished by any remarkable structural remains like those which offer such extraordinary interest to the explorer in the Southern States; and partly perhaps to the fact that local reports of them are not such as to invite a laborious journey of research. While the great palaces of Palenque and Yucatan are centres of superstitious tradition, tending rather towards an exaggerated description on the part of the present inhabitants, the mere rock carvings of the North West States are not of a nature to impress the native population as being of any interest. Consequently they are not usually to be heard of or traced without somewhat persistent enquiry.

During a recent sojourn of some months in the State of Sinaloa, the result of a few such investigations—conducted only as time and opportunity allowed—has caused me no little surprise at the wealth of early records revealed one after another in a region hitherto thought to be barren of interest as compared with other parts of Central America.

With the examination of each successive group of rock inscriptions which has thus come under my notice, I have found the conviction growing upon me that here is at least a strongly suggestive argument pointing to Pacific immigration—that is, the introduction of a contingent of population from the Asiatic Continent.

I proceed first to describe shortly the character and locality of the inscriptions which I have illustrated from sketched copies, taken at points which seemed to me of the greatest importance. For the present purpose I confine myself, for reasons to be indicated presently, to the group known to the local natives as Los Labrados, from which (with a single exception) my illustrations are taken. The locality is a remarkable one in several respects; and it is necessary to describe briefly the general characteristics of the surrounding country.

The eastern boundary of the State of Sinaloa runs approximately north and south down the centre of the Sierra Madre range—here some 150 to 200 miles in width. From the foothills of the mountains a country more or less hilly slopes to the Pacific coast, and almost the whole of this country throughout the length of the State, except where occupied by villages and cultivation, is covered by a bushy jungle, not impenetrable, but remarkably uniform in growth. Several rivers flow down with a tolerably direct course from the mountains to the ocean; but as this distance does not much exceed 100 miles, they are

not of sufficient volume to be navigable, and, if not actually dry, are for the most part at a very low ebb during the dry season from October to May. The ocean shore, except where interrupted by an occasional headland or low bluff, usually presents a broad expanse of sandy beach, fringed by the bush which extends from its upper edge into the interior. At the river outlets there are frequently lagoons of great length and extent running parallel to the shore.

The mouth of the river Piaxtla, at which point I obtained the first definite information respecting the Labrados, or "worked" stones, opens into a little bay partly protected by a hilly peninsula, and employed as an anchorage and landing place for small trading schooners.

It is situated about 35 miles north of the port of Mazatlan; and excepting a small custom-house with one officer, and two or three huts occupied by Mexican Indians, the spot has no population. Southward from this point, a broad sloping beach of sand sweeps away for many miles, broken only by a single abrupt headland, which has to be crossed by riding through the bush behind it.

At a point about five miles south of this headland, and ten or eleven from the Piaxtla, I found that the beach became somewhat suddenly strewn with large boulders of a dark blue open-grained basaltic rock, possibly the terminal of some ancient lava stream, covering the whole foreshore from the edge of the bush down to the sea, and into it, and extending along the beach for a distance of about a quarter of a mile. The boulders are more or less rounded and weather-worn, and appear for the most part to be separate masses, with a bulk of probably four or five up to fifteen or twenty tons each.

Immediately on approaching these rocks I observed that a large portion of them were covered with what were at one time deeply graven figures, of great number and variety, some of which were of a type already familiar to me amongst the rock carvings up the rivers. But the occurrence of this vast series of inscribed figures, extending from the brow of the beach down to the waves, and apparently even into the sea, in a locality of such singular desolation and solitude, was far more striking than any of those I had previously seen on the river cliffs, within reach of fertile and habitable spots. Here was a complete absence of every feature that could tempt human settlement; a dreary waste of exposed and inhospitable shore, a trackless and unbroken jungle for leagues inland, and not even a sign of fresh water within ten or a dozen miles.

The figures shown on the accompanying diagrams are selected from those which remained in the best preservation,

and could be copied without uncertainty. Many of the others, according to the position or exposure of the surfaces, were more or less obliterated, especially towards the water's edge, where they have been subjected for centuries to the direct action of the wind and spray. The groove is generally of a uniform width of three-quarters to one inch, apparently cut by vertical hammering upon a sharp-pointed instrument—presumably of hard stone. The figures as shown on the diagrams are about one-half the full size. The constant variety throughout the entire series is very remarkable, considering the immense amount of labour represented; there being, so far as I was able to observe, no two figures exactly or even nearly identical. It is noticeable that there seem to be three classes of figures distinguishable, viz.:—

1. Iconographic types, in which the human or an animal form is the basis, with or without appendages of a symbolic character.
2. Detached figures of a purely ornamental order, often accurately symmetric, and also with or without similar appendages.
3. Figures possibly symbolic, but so conventionalised as strongly to suggest the idea of written letters or words, and in one or two cases, of a continuous legend.

It is hardly necessary to remark that amongst the present people of the surrounding country there is no trace whatever of any knowledge, either pretended or traditional, as to the origin of these inscriptions. The same applies to numerous other instances of similar work upon rock-faces along the course of the rivers which I examined or was told of, extending up to the mountains, and in some cases far up into the ravines of the main range.

Amongst the most remarkable of these I may mention those of the Elota river at 30 miles inland; those of Cerrito, on the same river, 15 miles inland, one of which is included, for the sake of comparison, amongst the present illustrations; those of Aguacaliente, near Soquititan, amongst the foothills; those near the mining camp of Nuestra Señora on a stream among the head waters of the Elota, almost in the heart of the Sierra Madre; and those of Siqueros on the Mazatlan river about 40 miles up. There are many more as to which my information is not yet sufficiently definite to be worth recording.

The value of these rock-writings as a key to that contingent of ancient population which spread over these coasts and valleys seems to me of a very special character. I wish now to ask attention to the particular external evidences in this case, which point more or less positively towards that theory of Pacific

immigration which has so often been broached on less cogent grounds.

In the first place it is, I believe, an ascertained fact that within historic times storm-driven vessels from the Asiatic Continent have been cast upon North American shores, and especially during that period when the trade between Japan and Spain, by way of Acapulco as an intermediate port, was not inconsiderable. This having occurred during an epoch when there is no reason for assuming that the means and conditions of navigation had materially improved, it can scarcely be argued that it did not occur at intervals in far earlier times. There is no reason for assuming that the physical conditions have materially altered. The ocean current which sweeps down from Japanese seas towards the Californian shores, and thence, rounding the point of the Lower California Peninsula, impinges upon the Mexican coast, probably, if not certainly, took the same course in the primitive ages of the human race. The prevailing north-westerly gales which traverse those seas and coasts to-day must also be assumed to have existed then. Here on the site of Los Labrados we have the evidences of long residence at a singularly uninviting portion of the coast, by a people who for some reason were induced to spend an extraordinary amount of labour in leaving a permanent record of their occupancy. If these writings are of the nature of a memorial, can any such reason be conceived stronger than that of commemorating their wreck and subsequent deliverance on the shores of a newly-discovered land? Necessity compelled them to form a settlement at the first point where their feet found a resting place after weeks or months of hopeless drifting; and this point is the very spot one would have picked out as the scene of landing of a vessel which, having escaped the rocks of Cape St. Lucas, was hurried on under stress of the known winds and currents to the mainland of Sinaloa.

We can trace these definite probabilities still further. After a long struggle for existence at a spot where cultivation was difficult and water scarce, such a people would be led to explore with caution in both directions along the coast. In doing so they would encounter the habitat of the alligator or caïman, a head of which appears carved roughly out of a projecting angle on one of the Labrados rocks. Meeting with the river outlets they would follow up the valleys where abundant water and patches of open cultivable soil would at once invite new settlement. Here they would inscribe fresh records of the same, or a more developed type than the former ones, perhaps only returning to their original colony for the purpose of adding something to the historic story of their arrival. Of

such inland records, as already noted, almost every river valley in Sinaloa affords examples.

Whether, or how soon, they here encountered the traditions and customs of the interior tribes of Mexico can scarcely yet be suggested. There is one half-obliterated fragment of an inscription on the Elota river, which I am much inclined to interpret as the Mexican Eagle and Serpent, associated with figures of the same type as those of the Labrados. But without further confirmation it is not certain that in ancient times this distinctly southern symbol had crossed the Sierra Madre so far up. The absence of such would seem further to confirm the original independence of source of the Labrados inscriptions.

A further negative evidence is the absence of all the structural and industrial remains with which research has made us familiar on the sites of the interior. A people thus cast away in a strange country would be so thrown upon the immediate resources of the spot that they would doubtless have gradually deserted it without having developed, or learned from other sources, those methods of construction or manufacture which indicate a long period of occupation. Whereas, if we assume them to have been a tribe who penetrated the mountains from the interior, or arrived at these settlements coastwise from the south, it would be difficult to account for the complete absence of the implements, weapons, pottery, clay figures, and so forth, which are so widely scattered through the interior, and in many cases were undoubtedly conveyed for long distances.

Their dwellings and implements, on the contrary, would for a long period be of the most perishable sort, and hence one would not expect to find any remains of them on these original settlements. The only relics of human occupation of any kind whatever which I could find or hear of in the neighbourhood of the Labrados were a couple of rough burial pits, in which, from the description given to me, the remains interred had evidently been burnt. This was also the case in some similar pits on the river lands near the mouth of the Piaxtla.

At the present point of this enquiry one cannot venture to lay much stress upon the internal evidences of the writings themselves, though it cannot be denied that they offer the strongest temptations to do so. Further study and comparison cannot fail to throw light on their relations with other sources, and I am convinced that a thorough examination of the Sinaloa inscriptions would yield results of more than ordinary interest. At this moment I will only quote two remarks made to me recently by Mr. Diòsy, the Secretary of the Japan Society, on looking through the sketches: "The tapered figure marked A

—probably the horse's head—is decidedly South Sea Island in character; and the ring surrounding an inner ring filled with a cross (but without the radial processes shown in the drawing) is, as a matter of fact, the Japanese crest of Satsuma."

Whatever may be the value of these suggestions, it cannot, evidently, be fully established until the identities in question are further tested. That the great majority of these figures are the result of careful design, and not of mere idle caprice, cannot be disputed if one realises the amount of persistent manual labour employed in their formation. Their peculiar situation, and the evidences of their gradual extension until they met with and became merged in characters from another source, are, in my view, a forcible argument in favour of the origin I have again ventured to suggest.

It would at least be a matter for no surprise if the present growing persuasion of the Japanese, that they can claim the former highly cultured races of Central America as an offshoot of their own ancestry, should prove to be not wholly without foundation.

Discussion.

Mr. Daigoro Goh, Hon. Secretary of the Japan Society, Chancellor, Imperial Japanese Consulate-General in London, said: It is an honour to me to be called upon to speak on the exceedingly interesting and instructive lecture just delivered by Mr. Howarth. Being quite ignorant of the subject, I have learned the subject to-night much more than I can contribute any remarks to it. So far as I could understand, Mr. Howarth has done a great deal towards the confirmation of the belief that already exists, by the additional discoveries he made in Mexico, that that country has some connection with the Asiatic countries, and in doing so he laid stress upon the rock inscriptions in Mexico shown here to-night. While I am quite ready to join him in the belief, I must say that I do not see any resemblance in those figures of the inscriptions with the prehistoric characters in Japan, known as Hibunci or sun letters, nor do I find any similarity in the Aino writing. Moreover, I should like to remind the lecturer, who said that one of the inscriptions has the crest of the Prince of Satsuma, that that identification will not give any weight on his assertion, since the former must be a thing of several thousand years old, whilst the latter has had only a seven or eight centuries' existence. There are, however, many evidences which strengthen the belief. Someone is said to have pointed out the names of places in America, such as Canada, Ohio, &c., which are strikingly Japanese; whereas the other is credited to the discovery of certain designs and badges used by the South American Indian, remarkably similar to those of the Japanese. I believe, therefore, that if the communication of Mr. Howarth's

discoveries were made to the Anthropological Society of Japan, the most valuable information we listened to to-night would be gratefully received and profitably used by them in throwing the light of research on the subject. In suggesting this, I beg to express my appreciation of the discovery of these valuable and interesting materials for science.

Mr. LEWIS thought the carving which had been considered to represent the head of a horse was much more like that of an alligator. The carvings had a general, but not, so far as he remembered, an exact resemblance to others which had been brought before them. They probably had some meaning, but he did not think they were alphabetic, or even syllabic. He hoped Mr. Howarth would supply the Institute with copies to be preserved for comparison and reference.

Mr. HOWARTH: The reason for drawing special attention to the distinction between the three classes of inscription at Los Labrados, is that they seem to afford evidence as to the original writers having gradually encountered and adopted the ideas and iconographic forms used by the inhabitants of the interior. This is especially suggested by the variation in the types of inscription one meets with by tracing and following the work of these people up the rivers, as they began to leave the coast and penetrate into the mountains. The figures based upon human or animal forms, as distinguished from the purely ornamental, and also from those partaking clearly of the character of letters, seem to reveal this gradual introduction of the recognisable types from the Mexico valley and southern interior very clearly. As to the remark made about the recurrence of the same character or letter in the inscriptions, it will be observed that even in the short continuous inscription given amongst the Labrados series of sketches, there is one distinct instance of such recurrence. The three-pronged letter with a zigzag tail is repeated in combination with other letters, but it is, nevertheless, an unmistakable repetition.

On the use of NARCOTICS *by the* NICOBAR ISLANDERS, *and certain* DEFORMATIONS *connected therewith.* By E. H. MAN.

AT previous meetings of the Institute I have had the pleasure of contributing sundry papers on the constitution and culture of the Nicobar Islanders, and in the short time at my disposal to-night I propose making a few remarks on their use of narcotics and the physical peculiarities produced thereby.

Among the numerous races of Transgangetic India and the Malayan Archipelago who intentionally stain their teeth by the constant use of betel-nut and *pán* (*Chavica betel*), without subsequently cleansing, must be included the natives of these

islands where both sexes alike indulge in this, to us, objectionable habit: in common with the Javanese, Peguans, and Kasias, mentioned by the late Sir Henry Yule,[1] they ridicule persons who allow their teeth to resemble—in respect to colour—those of dogs, monkeys, and——Bengalis (!): *shīri âm*, "like a dog," or *shīri nōt*, "like a pig," are common replies when asked what causes their dislike to clean, white teeth.[2] They affirm, moreover, that a man with white teeth would have little chance of obtaining a wife among their own people, and I have known, as an instance in point, two adult brothers at Teressa, the sons of a headman, who until their twentieth year abstained from the practice, but ultimately found themselves compelled to conform to it in order to find favour in the eyes of their sweethearts. They were both naturally good-looking and well-made specimens of their race, but their white teeth effectually barred all their prospects of connubial bliss.

Mr. Busch, writing in 1845, remarked that the excessive use of betel-nut with *pán* and quick-lime "can hardly fail to injure their health, and perhaps it may be one cause of their generally not arriving at any advanced age nor being very prolific." Present experience, however, tends to the belief that, when compared with races similarly situated, the Nicobarese are not behind the rest of mankind in respect to longevity, while, judging from the ratio of children to the adult population, the natives of Car Nicobar and Chowra may be fairly described as prolific.

The custom is regarded with favour on various grounds, namely, as improving the personal appearance, as being agreeable to the taste, as strengthening to the gums, and possibly preservative of the teeth; it is further valuable in allaying the pangs of hunger while hunting, travelling, or otherwise engaged at a distance from home or beyond the reach of provisions; others again hold that the tone of the digestive organs is thus improved, and affirm that attacks of fever are thereby mitigated, if not entirely prevented. The fact that the breath is rendered fragrant, provided the mouth is subsequently rinsed or cleansed, does not appear to enter into their consideration, nor do they imagine that the practice is beneficial in any disease except fever. It is curious to note that the habit which has so strong a hold upon them has little or no effect on the keenness of their sense of taste, or on their powers of mastication, neither does

[1] *Vide* "Journ. Anthrop. Inst.," Feb. 1880.

[2] As the black encrustation, however thick it may become, being merely vegetable matter, breaks off if left exposed, and is not found adhering to the teeth of a disinterred body, the term *shīri âm*, "like a departed spirit," is also used to describe a person who has white teeth.

it impair their general health, nor prejudicially affect their appetite for ordinary food.

The custom of betel-chewing is usually commenced by both sexes about the tenth or twelfth year, but instances are by no means rare of children of from four to six years of age who have already become addicted to it; parents, however, ordinarily discourage such infantile precocity.

The quid is usually taken the first thing in the morning, and repeated at frequent intervals during the day, so that "betel-quid-taking-period" forms one of their computations of time, and implies an interval of some fifteen minutes' duration.

At Car Nicobar and Chowra, in order to prevent an accumulation of lime and vegetable matter on and between the teeth while indulging in this practice, betel-chewers are in the habit from time to time of rubbing the outer surface of their teeth with a small plug of tobacco, which is then inserted between the upper lips and the incisors, where it is retained for subsequent similar use, and in order to impart a certain flavour to the quid, from which, however, it is kept entirely apart; this is called *kanpaṅ-ok-kanâp*, and is never swallowed; it is changed perhaps two or three times in the course of the day, during which period eight or ten betel-quids may be disposed of. At Teressa and Bompoka shell-lime is added to some of their leaf-tobacco and employed in the same manner.

The natives of Car Nicobar generally swallow the quid gradually after it is thoroughly chewed, but at the other islands the more common practice is to eject it. If desirous of taking a drink, or tasting some dainty, while engaged in betel-chewing, and the quid be not in a fit state to be swallowed, a Car Nicobarese will at once spit it out, but at the other islands the half-chewed quid is held in the hand and replaced as soon as the craving of the moment has been satisfied.

In the Central and Southern portions of the group the betel-nut has hitherto been largely consumed in an unripe condition, which fact, together with neglect—except among those who, from regard to their personal appearance and comfort, rub or pick the teeth, or rinse the mouth after the disposal of each quid—accounts for the extraordinary and unsightly encrustations so commonly observed on the teeth of the middle-aged and elderly members of the various communities in these islands.

The shell-lime is usually placed in a folded chavica leaf[1] with a piece of betel-nut, and the whole is crammed into the mouth;

[1] At many of the islands it is customary to break off the pointed tip of the *pân* leaf and throw it aside. The object of this is said to be no longer known, but is believed to have originated in a desire to propitiate the ever present evil spirits by an offering.

those who have loose teeth or none usually masticate the quid in a species of mortar or crusher[1] before attempting to chew it; it is also a common practice with the villagers in this portion of the group to add to the half-chewed quid a plug of tobacco to enhance the flavour of the other ingredients.[2]

Smoking is another habit which is indulged in from a very early age,[3] and several kinds of tobacco have been introduced by traders from different countries, but that which is most largely used at the present day is the Chinese variety made up in paper packets.[4] Until recently, tobacco has been cultivated only at Teressa, but an attempt is now being made to grow it also at Car Nicobar; the date of the introduction of tobacco at Teressa is unknown, but the probabilities are in favour of some period within the last hundred years, and the variety is believed to be that commonly cultivated in Burma, whence the seed was doubtless originally obtained.[5]

In those islands—notably in the Southern group—at which trade is slack and a stock of tobacco liable to be exhausted, while fresh supplies are uncertain, the natives are in the habit of eking out their slender stores of the fragrant weed by wrapping all they possess in the large leaves of the *Macaranga tanarius*, which, while well adapted for this purpose by keeping the tobacco fresh, has also the desirable property of absorbing some of the aroma, so that when emptied of their contents they in turn can be smoked *faute de mieux*.

Except in the case of cheroots received from visitors, tobacco is invariably smoked in the form of cigarettes. Although the *Nipa fruticans* flourishes in these islands, and *Areca* spathes are always easily obtainable, they are not used by the Nicobarese, as by the Malays and Burmans, for making cigarette wrappers; at the northernmost islands the skin of the *Pandanus* leaf (uncultivated variety) is used,[6] while in the Central and Southern groups respectively, the dried leaves of two plants admirably

[1] This implement has evidently been borrowed from the similar object in use among the Malays.

[2] They declare that if inserted at the same time as a fresh betel quid, nausea and giddiness are produced.

[3] Those who don't chew tobacco usually smoke the more.

[4] At Car Nicobar the generic name of all varieties is "*tabâka*."

[5] The leaf of the locally-grown tobacco is plucked in the dry season, and is suspended by the stems to strings fastened across the interior of their huts, where they are dried by the smoke sufficiently to be ready, either for smoking or chewing, in about ten days.

[6] In preparing a *Pandanus* leaf to serve as a cigarette wrapper, the women, on whom this duty devolves, first scrape both sides of the leaf several times with the blade of a knife, whereby the leaf is made pliant; after this the rolling of the tobacco in the improvised wrapper can be accomplished by either sex. The *damîat* wrapper used in the Central and Southern islands requires no such preparation, and cigarettes there are made by both sexes.

adapted for the purpose are similarly employed; the tobacco being placed in a strip of leaf, is rolled obliquely to a length of 3 to 4 inches.[1]

No other substances than those above-mentioned are chewed or smoked and there are no ceremonies connected with either habit. The shell lime for the quid is usually kept in a small coconut-shell box which, together with a packet of *Chavica* leaves and some betel-nuts, are placed in a spathe box or other receptacle: many persons now-a-days possess themselves of the ordinary lacquer box with trays which are commonly made and used in Burma for this purpose.

The betel-nut (*Areca Catechu*) is now no longer cultivated, being plentiful in all the islands, indeed in some parts the produce is so much in excess of the local requirements as to allow of a fair quantity being exported. Three varieties of the betel-leaf pepper vine are found in these islands, viz.:—*Chavica betel*, which is cultivated, and, from the fact that it was introduced into the group, is called "*akai-kaling*" (lit. the foreign betel-leaf); secondly, *Chavica macrostachya*, called "*akai-ka*," an indigenous variety which is less esteemed and is reserved chiefly for use during periods of mourning or for children when acquiring the habit; a third variety, not yet identified, is also indigenous, it is called "*akai-kēn*" (lit. "monkey-betel-nut") and is never used.

Betel-chewing, it should be added, is also in vogue among the *Shom Peň*, but whether it has been adopted—as seems most probable—in recent years since they have entered into amicable relations with the coast people, and have through their agency been able to procure shell-lime and extend the cultivation of the edible *Areca*-nut, or whether the practice dates from more remote times, is impossible at the present day to determine. They have also learnt to smoke, and I have seen youths, when supplied with a little tobacco, set to work manufacturing cigarettes for themselves.

In close connection with the practice we have been considering is a physical peculiarity resulting from it, and which amounts almost to a deformation.

In Dr. Rink's interesting sketch of his visit to the Nicobars in 1846 occurs the following passage: "the frequent use of betel and lime in the first place gives them black teeth; this they attempt to increase by rubbing: they file off the enamel and by manipulation with some kind of acid juices they produce such an effect that the teeth swell to a spongy mass, and

[1] These are known by the names *damīat* (also *tań-maiū*), *Amomum Fenzlii* (Kurz), and *kanyūa-da-fai*, the botanical name of which has not yet been ascertained.

the front teeth combine with each other. In some individuals this does not succeed, but in others the incisors are actually changed into one continuous mass which projects from the mouth because the lips cannot close on account of its large size." As nothing can at the present day be ascertained even from individuals of seventy years of age in confirmation of the above statement it is probable that Dr. Rink either obtained his information from some untrustworthy source or formed an incorrect judgment from what he himself observed in respect to the extraordinary dental encrustation, which is the result, though not the object, of the habit which conduces to its formation. To quote another authority on the Nicobars—Père Barbe: "men and women use so large a quantity of betel-nut, lime, and betel-leaves that their teeth are as black as ink, and the space between them being filled with that matter they appear as a solid piece, much like the horn invested in the mouth of the tortoise." This custom, which is confined almost entirely to the communities of the Central and Southern islands, may be, I think, attributed to the following causes:—1st, in these portions of the group the natives are not in the habit of rubbing or cleaning their teeth with a tobacco quid (*ôl-tâ-kòicha*) as is the case elsewhere; and 2ndly, they commonly eat the unripe *Areca*-nut in preference to the ripe,[1] using at the same time excessive quantities of quick-lime with every quid. It would seem, however, that increased intercourse with aliens is at the present day leading to the gradual abandonment of the custom, as is evidenced by the decrease in the number of persons who may now be seen so disfigured.

Teeth thickly encrusted in the manner above described are styled "*yēñ-kanâp*," and a period of a few weeks suffices to produce the deformation, provided that the individual desiring this disfigurement takes the betel-quid frequently, cuts up his food to avoid mastication, and carefully abstains from picking or rubbing his teeth. Only two cases of "*yēñ-kanâp*" have hitherto been observed among the *Shom Peṅ*, both being women, one on the east, and the other on the west, coast of Great Nicobar.

In connection with the foregoing physical peculiarities, albeit unintentionally produced, it will be of interest to note in this place certain cranial and facial deformations which are practised among the Nicobarese, but not universally or to the same extent in each community.

[1] The use of the unripe nut is universal in the Southern group, and is preferred by those in the Central group, whose teeth are not strong, and who are partial to the condition of torpor, lethargy, and semi-intoxication which is said to be produced thereby.

When exhibiting and describing some ethnological specimens from Borneo at the Anthropological Institute in December, 1885, Mr. W. M. Croker drew attention to the fact that, although the numerous tribes along the north-west coast of that large island are known to belong to one great family, singular differences are found to exist in certain of their manners and customs, and, in support of his statement, he mentioned that the practice of flattening the foreheads of children is confined to one only of these tribes. Among the Nicobarese a similar diversity of custom prevails; the natives of the Central and Southern islands (excepting the *Shom Peñ* or inland tribe) are singular among their compatriots in their adherence to the practice of cranial deformations; and in the absence of any recognized, intentional, or distinctive tribal marks, this custom, producing as it does in the majority of cases a marked difference in the shape of the profile from its natural form,[1] is in itself sufficient to enable an observer, after studying members of the Northern and Southern sections of the group, to classify them with the utmost confidence, and when on further examination other existing peculiarities in the several tribes are noted, he is able to distinguish with the like certainty the individual members of the different communities.

As the flattening of the occiput and forehead (*kōi-ta-pitâñh*) is considered of the highest importance by the communities of the Central and Southern islands, it will be well to describe the process in detail. Seated cross-legged on the floor of the hut near the hearth, the mother lays the infant—be it boy or girl—on its back across her knee, with a small pillow (*entōma-kōi*) or calico pad about 10 inches long under its head; warming her hands from time to time at the fire, or over the flame of the rude lamp, if night have set in, she gently presses the brow with the palm and out-spread fingers of both hands for an hour or more at a time, taking care the while never to exert such force as might cause the little one even momentary discomfort; the operation has, indeed, rather a soothing effect, for the child usually falls placidly asleep during the process.[2] The desired result is, of course, thus produced only by very slow degrees, and the habit is seldom abandoned until the child is old enough to run about, and accordingly resents the enforced hours of inaction and confinement to one position; the skull also is by that time (the second or third year) hardly soft enough to be

[1] The prevailing form of skull among the Nicobarese is believed to be brachycephalic. (*Vide* "Note of a Nicobarese Skull," by Prof. Flower, F.R.S., "Journ. Anthrop. Inst.")

[2] Which could hardly be the case if instruments were used, such as were exhibited by Mr. Croker, as employed by the Milanows for the like purpose.

affected by such gentle measures. The sole object of the practice is declared to be the improvement of the appearance of the person in after years; no other benefit is believed to be obtained thereby, and no evil consequences appear to ensue therefrom. From the care taken to keep the infant as much as possible on its back, whether in its mother's lap or on a cloth on the floor, the risk of unilateral deformities being produced is minimized.

As I have already remarked, this practice is confined to the inhabitants of the Central and Southern islands of the group, and the Northern islanders account for the absence of any such custom among themselves by saying that they have no sympathy with the motives or tastes which prompt their neighbours to its adoption; and it really seems as if they have the good sense to prefer that the head should retain its natural form, for, as far as can be ascertained, there are no superstitions to be found to account for their non-observance of the habit on any other ground.

In a paper contributed to the "Asiatic Researches" (vol. iii, Art. vii), Mr. N. Fontana, who visited the islands upwards of a century ago, mentions the existence of the above-named practice, and adds that among the desired objects to be attained thereby is that "the hair remains close[1] to the head as nature intended it, and the upper fore-teeth very prominent out of the mouth"; the latter portion of this statement is not confirmed by our present knowledge, for, while no effect appears to be produced on the position of the teeth by the manipulation of the skull in the manner above described, the natives concur in expressing their dislike of any undue prominence of the incisors, and evidence, in support of their assertion, the great care displayed by mothers in continually applying pressure, though of the slightest, to the upper and lower lips of their children, while engaged in their affectionate task of moulding the plastic features. As a wide mouth and prominent nose are not esteemed marks of beauty, one frequently sees mothers pressing inwards the corners of the mouth and depressing the bridge of the nose while nursing their infants.

The peculiarity in regard to the prominence of the fore-teeth which, despite the foregoing remarks, is not unfrequently to be observed in elderly members of this race, may be explained, I think, by the simple fact that, as they advance in years and become indifferent to their personal appearance, they learn to qualify the indispensable quid of betel-nut, and *Chavica* leaf

[1] The Teressa and Bompoka women train their babies' hair to grow erect on the scalp by constantly raising and combing it with the fingers, with the result that, as they usually keep it clipped, persons of both sexes are frequently to be seen at those islands with bristly wigs.

with a little quick-lime, applying the latter to the back of the upper and lower incisors with the thumb, and as it is necessary, in order to remove all traces of the lime from the thumb, that the process should be repeated two or three times in succession, and with a certain amount of pressure on each occasion, the natural effect is the gradual advancement of the fore-teeth in both jaws to such an extent, in some cases, as in conjunction with the encrustation on these teeth caused by the habit, to form an impediment to the closing of the lips.

Deformations of the trunk or limbs, *e.g.*, alteration in the form of, or hindrances to, the development of the breasts, elongation of the mammæ or of the teats, filing of the teeth,[1] amputation of part or the whole of the fingers,[2] checking the growth of the feet, castration, and in short, all forms of mutilation, are unknown among the institutions of the Nicobarese, as are also circumcision, the adoption of distinctive tribal-marks, and the almost world-wide custom of tattooing the person; though cicatrices are frequently produced through the supposed remedial process of scarifying, the practice of intentionally producing scars on any portion of the body, head, or limbs, by way of ornament, or any other reason, is likewise non-existent in these islands.

The custom so common in the adjacent peninsula—and indeed from the borders of Assam to the coasts of Borneo—of deforming the ears[3] by inserting large discs or wooden cylinders in the lobes, though in reality a deformation, is regarded by these, as well as by other, natives as an improvement on nature; though the distension of the ear-lobe in this manner is esteemed a decoration, and is adopted throughout the group, the discomfort it entails would probably have long since led to its discontinuance were it not commenced in early infancy. This practice is one of many which, in my opinion, establishes an affinity between the Nicobarese and the great Indo-Chinese family, but questions of social contact and racial affinity lie outside the scope of this paper, even had they not been dealt with by me on a previous occasion.[4]

[1] An unauthenticated statement by a young native of the Central group has been made to me to the effect that an old man who died some years ago at Nancowry, when a youth of 12, filed his upper teeth so that later on when they became encrusted they might not exceed their natural size.

[2] It follows, therefore, that no authority can be discovered for the statement on this point made by G. Hamilton concerning Car Nicobar, which he appears to have visited at the close of the last century; speaking of the practices observed on the death of a married man, he states that the widow "must conform to custom by having a joint cut off from one of her fingers."

[3] Among the *Shom Pen* the perforation of the ear-lobe is said to be undertaken when puberty is reached in either sex, in confirmation of which statement I observed a girl of about 12 with her ears unpierced.

[4] *Vide* "Journ. Anthrop. Inst.," May, 1889.

NOVEMBER 14TH, 1893.

Professor A. MACALISTER, F.R.S., *President, in the Chair.*
Afterwards, Sir WILLIAM FLOWER, K.C.B.

The Minutes of the last Meeting were read and signed.

The following elections were announced:—

E. WESTON BELL, Esq., of Belmont, Dundee.
J. E. CROMBIE, Esq., of Balgownie Lodge, Aberdeen.
Rev. T. WILTON DAVIES, of Baptist College, Nottingham.
J. L. MYRES, Esq., M.A., of Magdalen College, Oxford.
JOHN REVILLIOD, Esq., of 52, Stanhope Gardens.

The presents that had been received were announced, and thanks voted to the respective donors.

Professor BOYD DAWKINS exhibited (i) a series of specimens illustrating the manufacture of flint implements from Cissbury flint mines; (ii) a series of palæolithic implements found in one stratum in the caves of the Cresswell Crags; (iii) a series of stone implements from the Red Indian station at Trenton, New Jersey.

Professor BOYD DAWKINS read a paper on the "Relation of the Palæolithic to the Neolithic Period."

Mr. J. ALLEN BROWN, Mr. C. H. READ, Mr. A. L. LEWIS, Dr. ROBINSON, Dr. GARSON, Mr. RUDLER, and Sir WILLIAM FLOWER joined in the discussion, and the author replied.

A paper on the "Flint Implements of the Chalk Plateau of Kent," by Mr. A. M. BELL, was read.

On the RELATION *of the* PALÆOLITHIC *to the* NEOLITHIC PERIOD.

By Professor BOYD DAWKINS, M.A., F.R.S.

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I. *Introductory.*

IN 1868 I read a paper before the International Congress of Prehistoric Archæology on the Prehistoric Mammalia of Great Britain,[1] in which the profound difference was pointed out between the Pleistocene and Prehistoric faunas, and evidence was brought forward that the one belongs to a period when Britain was continental, and the other to a period when it was insular, both in geography and climate. Since that time, in various communications to the Geological Society, in "Cave-hunting," and in "Early Man in Britain," the new facts bearing on the relation of the Pleistocene to the Prehistoric period have been analysed with the following results. They prove that the two periods are separated from each other by a revolution in climate, geography, and in animal life, and that Palæolithic man belongs to the one, and Neolithic man to the other. This conclusion has recently been traversed by Mr. J. Allen Brown, in his paper "On the continuity of the Palæolithic and Neolithic Periods."[2] "The supposed break," he writes, "in the continuity of the stone age in this country (in Britain) is bridged by the discovery of implements of later Palæolithic type, and of others which from their form may be regarded as of transition or intermediate age in some combes and dry valleys, associated with deposits of chalk and flint rubble in various parts of Sussex, as well as

[1] "Norwich Volume," 1868.
[2] "Journ. Anthrop. Inst.," xxii, 66.

with other accumulations and formations to which I shall refer as being of more recent date than the high level river drifts." The question between us is of so much importance to archæologists generally, that it is well worthy of being threshed out in the light of the newest discoveries.

I shall first of all address myself to the point as to continuity in this country. Is there any evidence that the Palæolithic shaded off into the Neolithic age *in this country* without any such break as I have mentioned above? Next I shall examine the facts bearing on the point outside the British Isles, premising that the evolution of the Neolithic from the Palæolithic stage of culture in some part of the world may be accepted as a high probability, although we may be unable to fix with precision the land where this transition took place. Into this latter question I do not propose to enter.

II. *The evidence of the Mammalia.*

We will first take the evidence, which has been accumulated during the last thirty years, as to the mammalia associated with Palæolithic and Neolithic man in various deposits in this country, and on the continent.

IIA. *Palæolithic Mammalia.*

The following mammalia occur in Great Britain in association with Palæolithic implements in the Pleistocene river-deposits and the caves, omitting the smaller and unimportant species[1]:—

	River deposits.	Caves.
Cave bear (*U. spelæus*)	..	×
Grizzly bear (*U. ferox*)	×	×
Brown bear (*U. arctos*)	×	×
Otter (*Lutra vulgaris*)	..	×
Wolf (*Canis lupus*)	×	×
Spotted hyæna (*H. spelæa*)	×	×
Wild cat (*Felis catus*)	×	×
Leopard (*F. pardus*)	..	×
Lion (*F. spelæa*)	×	×
Sabre-toothed lion (*Machairodus*)	..	×
Irish elk (*Megaceros hibernicus*)	×	×
Reindeer (*Cervus tarandus*)	×	×
Stag (*C. elaphus*)	×	×
Roe (*C. capreolus*)	×	×
Musk sheep (*Ovibos moschatus*)	×	..
Urus (*Bos primigenius*)	×	×

[1] These lists are based on the evidence published in "Cave-Hunting," pp. 360–1, and in "Quart. Geol. Journ.," xxv, p. 192; xxviii, p. 410; xxxiii, p. 607; xxxv, p. 724; xxxvi, 395–400.

	River deposits.	Caves.
Bison (*B. priscus*)	×	×
Hippopotamus (*H. amphibius*)	×	×
Wild boar (*Sus scrofa ferus*)	×	×
Horse (*Equus caballus*)	×	×
Leptorhine rhinoceros (*R. leptorhinus omus*)	×	×
Woolly rhinoceros (*R. tichorhinus*)	×	×
Straight-tusked elephant (*Elephas antiquus*)	×	..
Mammoth (*E. primigenius*)	×	×
Pouched marmot (*Spermophilus citillus*)	×	×
Lemming (*Mus lemus*)	×	×
Beaver (*Castor fiber*)	×	×

These animals inhabited South and Eastern England after the Glacial period, as Lyell and Evans point out, and their remains lie in the river deposits which have resulted from the break-up of the boulder clays; such as in the Thames and its tributaries, and in the Ouse near Bedford. In some cases, as at Hoxne in Suffolk, they also occur in strata resting on, and therefore newer than, the boulder clay. They form a part of the mammal fauna which found its way into Europe at the beginning of the Pleistocene age, and which lived on the great mass of continental land then stretching far away to the 100-fathom line in the Atlantic, before, during, and after the Glacial period. When the glacial cold was most severe the arctic mammalia, such as the musk-sheep and reindeer, advanced as far south as the Pyrenees.[1] As the climate grew milder the southern animals, such as the hippopotamus and spotted hyæna, were tempted as far north as Yorkshire. The presence of these animals in Britain in post-glacial times proves that our country then formed part of the continent of Europe, and that it was possible for the river-drift man and the cave man to follow the chase across the valley of the English Channel, from the plains of France into the forests of the south of England.[2] (Fig. 1.)

The Palæolithic mammalia in Europe, north of the Alps and Pyrenees, are identical with those in the British Isles, and the

[1] Prof. James Geikie's view that the glacial cold killed off the characteristic Pleistocene mammalia is rendered untenable by the fact that in Britain (Hoxne in Suffolk, Bedford, &c.) and in North America (Bigbone Lick, &c.) they occur in superficial strata later than the glacial period. His view also that the arctic mammalia belong to a glacial, and the southern to an interglacial age, is also negatived by the remains of the two groups lying side by side in the river deposits and caves both of Europe and America. The fact that the bones and antlers of the reindeer have been gnawed by the hyæna in most of the caves of Britain and of the Continent north of the Alps and Pyrenees, is conclusive proof that both lived in the same district at the same time, and that the one was eaten up by the other.

[2] "Early Man in Britain," chaps. v, vi, vii.

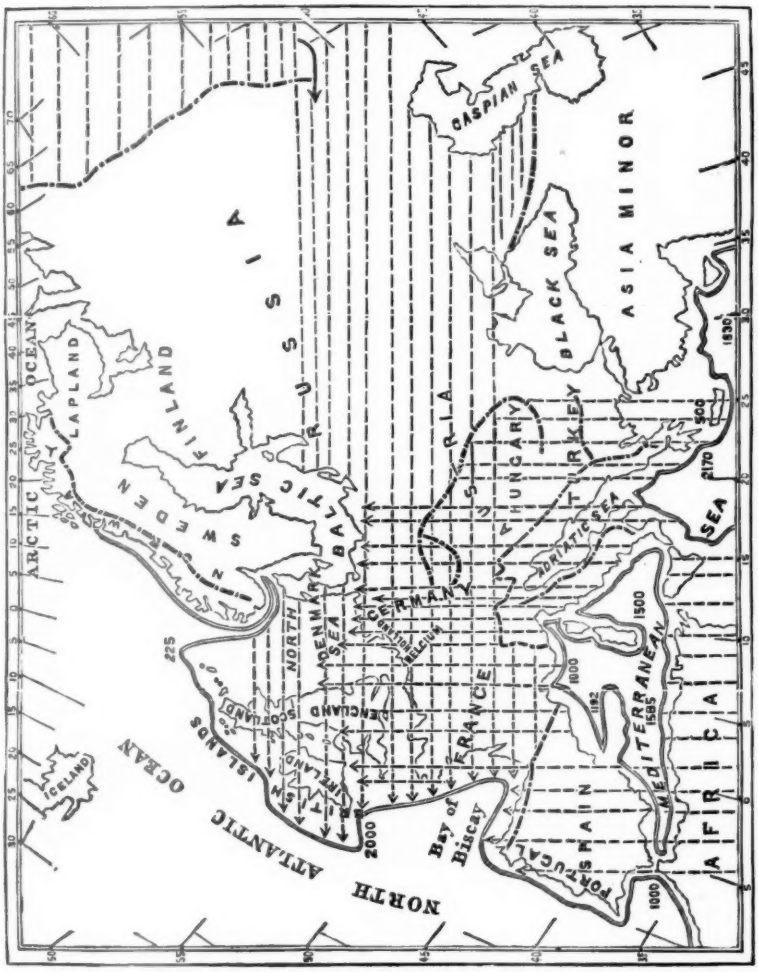

FIG. 1.

PLEISTOCENE EUROPE, SHOWING THE RANGE OF NORTHERN (HORIZONTAL LINES) AND SOUTHERN (VERTICAL LINES) MAMMALIA.

association of species, both northern and southern, is the same. To the south, however, of these mountain boundaries the northern group is conspicuous by its absence. The sub-division of the Pleistocene period into four ages, proposed by M. Ed. Lartet more than thirty years ago, has been disproved by the progress of discovery in France, Germany, and Belgium, as well as in our own country. In the river deposits, and in the caves, the species which he supposed to be characteristic of each stage are found lying together under conditions which leave no doubt as to their having lived at the same time in the same place. The gnawed and tooth-marked remains, for example, of the mammoth, the reindeer, and the bison found in the palæolithic caves of France, Germany, and Britain, leave no possibility of doubt that those three animals, supposed to characterise the three later ages, formed the daily food of the cave-hyæna, which is supposed to belong to the first.

IIB. *The Neolithic Mammalia.*

I turn now to the Neolithic mammalia in Britain, discovered in refuse heaps, in burial places, or in mines made in the search for flint for the manufacture of the higher Neolithic implements. They consist of the following species, leaving out the smaller and more unimportant forms, such as foxes and badgers.

	The Chambered Tombs of Cefn and Rhos Digre. — The Sepulchral Caves of Perthi Chawren.	Flint Mines at Grimes Graves.	Flint Mines at Cissbury.
Wild.			
Urus (*Bos primigenius*)	..	..	×
Stag (*Cervus elaphus*)	×	×	×
Roe (*C. capreolus*)	..	..	×
Wild boar (*Sus scrofa ferus*) ..	..	..	×
Horse [?] (*Equus caballus*)	×	..	×
Domestic.			
Short-horn (*Bos longifrons*) ..	×	×	×
Goat (*Capra hircus*)	×	×	×
Hog (*Sus scrofa domesticus*) ..	×	×	×
Dog (*Canis familiaris*)	×	×	×
Horse [?] (*Equus caballus*)	×	..	×

In this list of wild animals we look in vain for the larger and fiercer mammalia of the Palæolithic times, although in some of the caverns, such as those at Cresswell, and Kent's Hole, near Torquay, the Neolithic deposits are at the top and the Palæolithic are at the bottom, implying that the caverns were used as shelters during both periods. The woolly and the leptorhine rhinoceros, the mammoth, the *elephas antiquus*, the cave bear, and the sabre-toothed lion, had not merely disappeared from the face of this country before the Neolithic age, but had become extinct; and the more southern animals, such as the hippopotamus and hyæna, had passed away along with the continental and climatal conditions which rendered their sojourn in this country possible, leaving behind the ancestors of those animals which constitute the prehistoric and historic mammal fauna of Britain.

III. *The Contrast in the Faunas implies a Break.*

The mere contrast between the Palæolithic and wild Neolithic faunas implies a zoological break of the first magnitude, which could only have been brought about by a series of changes, going on through long periods of time. And this contrast is presented not merely by the results of exploration of Palæolithic and Neolithic sites in this country, but over the whole of Europe. And still more is this contrast emphasised by the arrival in this country, and in Europe generally, of the domestic animals introduced from the south and the east under the care of the Neolithic herdsman and farmer. These are without exception conspicuous by their absence from undisturbed Pleistocene deposits.

IV. *The Evidence of the Caverns.*

It is however objected that the occurrence in caves such as Cresswell, Kent's Hole, and in sundry caves on the Continent, of the Neolithic strata at the top, and the Palæolithic below, implies a continuity between the Palæolithic and Neolithic periods. (Mr. Allen Brown, *op. cit.*, pp. 82–93.) In all these, and in large numbers of other caves which have been explored during the last fifty years, in Britain and on the Continent, there is the same contrast as that indicated above between the Palæolithic and the wild Neolithic faunas. And what is much more important, the remains of the domestic animals are found *alone* in the upper Prehistoric strata. Moreover in a great many cases the lower Palæolithic strata are sealed down, and mapped off from the Neolithic, by a layer of stalagmite, sometimes of considerable thickness, which indicates, beyond all doubt, an interval of time, and a break of continuity, between the two

periods. The exploration of caverns has not, I submit, yet resulted in establishing a "continuity" but simply a sequence. It offers conclusive proof that the interval between the two was sufficiently long to bring about a change in the wild mammalia of Europe, of the same order of magnitude as that which separates the Pliocene from the Pleistocene periods.

V. *The Palæolithic Period continental, the Neolithic insular in North-Western Europe.*

The sinking of the North-Western coast line of Europe, so as to sever the British Isles from the Continent (Fig. 2), and the

FIG. 2.

NEOLITHIC BRITAIN.

sinking in the Mediterranean area, so as to isolate Europe from Africa, and to convert the mountain ranges into the islands now studding the surface of the Mediterranean sea, are, as I have elsewhere pointed out, among geographical changes which took place in this interval. On the one side of this interval you have the Palæolithic hunter, and the Palæolithic mammalia, living on a vast continent closely united with Africa, and ranging to the north-west as far as the 100-fathom line (Fig. 1); on the

other you have the Neolithic herdsman, with his domestic animals, living at a time when the geography of Europe was almost what it is now—when the sea line was almost where it is now, in the west—when the shores of Denmark were sufficiently near to the shell mounds, now dotting the coast of Jutland, to allow of Neolithic man obtaining an ample supply of shell fish from the neighbouring fiords.[1]

VI. *The Break in Civilization.*

If, however, the results as I read them, over the whole of Europe, point to the great interval dividing the Palæolithic from the Neolithic age, and to the great geographical break between them, still more shall we find these conclusions confirmed by the contrast between the Palæolithic and Neolithic civilisations. On the one hand—it is unnecessary to labour the minute details—the Palæolithic man lived by hunting the wild animals on the Pleistocene continent, armed with rude implements of stone and bone, and ignorant of all the domestic animals including the hunting dog.[2] He was a fire-using nomad, without fixed habitation. On the other hand the Neolithic man appears before us a herdsman and tiller of the ground, depending upon his domestic animals and the cultivated fruits and seeds rather than on hunting; master of the potter's art, and of the mysteries of spinning and weaving, and seeking the materials for his tools by mining. He lived in fixed habitations, and buried his dead in tombs. There is obviously a great gulf fixed between the rude hunter civilisation of the one, and the agricultural and pastoral civilisation of the other, a gulf which has not yet been bridged over by discoveries in any part of the world.

VII. *The alleged new evidence as to Continuity.*

It is alleged, however, that a continuity between the Palæolithic and Neolithic ages has been established by the flint implements scattered on the surface of the South Downs, and more particularly between Eastbourne and Newhaven. These implements, to which attention was drawn by Gen. Pitt Rivers as far back as 1868 ("Archæologia," xlii), are ploughed up in the fallows, and vary from the roughly chipped blocks to

[1] The implements, polished and rough, and the remains of the domestic *Bos longifrons*, the goat, and the dog, prove the kitchen-middens to be Neolithic.

[2] The interment in the Trou du Frontal, considered by M. Dupont to be Palæolithic, is in my opinion Neolithic. It contains skeletons, pottery, and domestic animals—the dog, goat, hog, and probably *Bos longifrons*—of well-defined Neolithic type. Dupont: "Le Temps Préhistorique en Belgique," 8vo., 1872.

the well chipped Neolithic axe. They are not found in any stratified deposit which might give a clue to their age. I submit that these waifs and strays are worthless for purposes of archæological classification. They are, however, amply represented in the refuse heaps and old mining shafts at Cissbury,[1] and Grimes Graves,[2] near Brandon, in Suffolk, and are therefore to be referred to the time when these flint mines were in active use.

VIII. *The Age of the Cissbury Flint Mines.*

What then is the age of these flint mines? Gen. Pitt Rivers in his papers on Cissbury, before the Society of Antiquaries and the Anthropological Institute, points out that there are rude implements of various Palæolithic forms in the refuse heaps. He leaves their age an open question. It may, however, be taken to be Neolithic from the following considerations.

1. That although, so far as I am aware, only two fragments of polished axes have been met with, one by Gen. Pitt Rivers, and the other by Mr. Ernest Willett and myself, numerous fragments of well known types of Neolithic axes have been discovered. (See specimens on the table.)
2. The picks of deer antler used in the workings are of the same shape as those of Grimes Graves, in which Neolithic polished stone axes were used.
3. The domestic animals used for food by the miners are those which were unknown in Europe before the Neolithic age. They were in common use in the Neolithic age and afterwards.
4. The pottery is Neolithic.[3]
5. The skeleton, found in one of the shafts, belongs to the long-headed Iberic race which inhabited Britain, and the west of Europe generally, in the Neolithic age.
6. The whole group of remains at Cissbury is of the same type as that at Grimes Graves, which is proved by Canon Greenwell to be of Neolithic age, not only from the discovery of polished stone axes in the workings, but by the cuts of the polished stone axes in the chalk walls of the passages. All these facts point to the obvious conclusion that these mines were begun and carried on in the Neolithic age.

They were probably worked during a very long period, and

[1] "Archæologia," xlii, xlv, 333. "Journ. Anthrop. Inst.," v, 357; vi, 20; vi, 430; vii, 412.
[2] "Journ. Ethnol. Soc. Lond.," ii, 419.
[3] "Journ. Anthrop. Inst.," vii, 412.

are proved by the discoveries made by Mr. Park Harrison, in 1876–7, and laid before the Institute, to have been open as late as the Prehistoric Iron age.

IX. *The occurrence of Flints chipped in the Palæolithic manner in the Refuse Heaps.*

It is, however, contended that the occurrence of flints chipped in the Palæolithic fashion is evidence that the workings go back to the Palæolithic age, and that their association with Neolithic types implies a continuity.

This, however, is met by the following consideration. Gen. Pitt Rivers pointed out, in 1866, that Cissbury was a great flint mining and manufacturing centre, in which the flint was mined and worked on the spot. In the vast accumulations of refuse, representing every stage in the chipping, from the rough block of flint fresh from the mine, to the highly finished axe, broken in the last stage of chipping by an unhappy blow, it is obvious that there must be some which would represent well-known Palæolithic types. In the series upon the table I have, among others, Mr. Brown's "Eolithic," "Palæolithic," and "Mesolithic" types.

The last (*op. cit.* Pl. III, Fig. 1) seems to me a case of the arrested development of a flint block, on its way towards the finely chipped Neolithic axe, of a type common in Southern and Eastern England. The whole of the refuse heap is composed of splinters and fragments, and wastrels rejected by the flint workers. The finished and perfect implements are as conspicuous by their absence as perfect gun-flints in a flint-knapper's yard. They have been carried off for use, and are to be sought in the Neolithic habitations and tombs. It is obvious, therefore, that the whole accumulation must be read by the light of those implements which are nearest the final stage of manufacture. And when we find among the wastrels all the Palæolithic forms, it is clear that the latter are the result of manufacture in the Neolithic age, and that they offer no proof of continuity between that age and the Palæolithic. The evidence of continuity breaks down here, as it breaks down everywhere else.

The flint mines of Cissbury and Grimes Graves, near Brandon, offer a base line for archæological research which the surface finds of the South Downs do not offer. They show that mere form is of comparatively slight importance as compared with association, and further that the implements of Palæolithic form which lie scattered over the surface of Southern England, are not necessarily of Palæolithic age; and further than this they prove that the principle of classification by form alone, by

which at the present time the range of Palæolithic man has been extended over North America, is wrong, and can only lead to erroneous conclusions.

X. *Conclusion.*

In conclusion it only remains for me to say, that, so far as I know, the progress of discovery has not yet bridged over the abyss separating the Palæolithic age of the Pleistocene period, from the Neolithic age of the Prehistoric period, in any part of the world. It is as clearly marked in India and on the Mediterranean shores of Europe, and of Asia and Africa, as it is in Britain. We must look upon mankind, with Prof. Draper, "as one man, always living and incessantly learning," but the intermediate stages, by which he passed from the Palæolithic to the Neolithic stage of civilisation, still remain to be discovered, equally with those links in evolution which connect him with the higher apes.

NOTES *on* EXHIBITS. By Professor BOYD DAWKINS.

SERIES of NEOLITHIC IMPLEMENTS from the Flint-mines of Cissbury, near Worthing, Sussex, illustrating the various stages in the manufacture of implements.

First Group.

A. Axes begun. Flint-blocks roughly chipped and simulating Palæolithic implements.
B. One side chipped.
C. Two sides chipped.
D. "Mesolithic" series.
E. Neolithic axe nearly finished, but broken.

Second Group.

A. Implement roughly blocked out, pointed at end, and simulating a Palæolithic type.
B. Implement partially chipped = chopper type.
C. Small axes roughly blocked out.
D. "Mesolithic" series.
E. Neolithic axe nearly finished, but broken.
F. Flakes and splinters.
G. Hammer stones.

It is clear from the examination of the above series that the Palæolithic and "Mesolithic" forms are merely stages in the manufacture of the true Neolithic types; and further than this, that the Palæolithic form does not necessarily imply the Palæolithic age. The confusion of the Palæolithic form into the Palæolithic age has already led to rash and hasty generalisation in the United States, and is likely to impede the progress of Prehistoric Archæology in Europe.

SERIES of PALÆOLITHIC IMPLEMENTS from the Cave-earth in the Cresswell Caves, illustrating the association of forms.

This series shows the association of the rude so-called "Eolithic" implements of the Upper Plateau gravel with well known River-drift hâches of the Amiens and Abbeville types. They were obtained from an undisturbed stratum of cave-earth which was for the most part sealed down with a layer of stalagmite. The manufacture of implements had been carried on in the caves, and the finished implements were, of course, carried off for use, or were merely represented by those which had been broken or lost.

In the making of the higher palæolithic forms, the splinters and other rude fragments of the block must preponderate in the places of manufacture, while the finished implements are carried off for use elsewhere, and are likely to be more numerous where they have been used and lost. I am therefore unable to follow Prof. Prestwich in the view that the rude implements which preponderate over the finished hâches on the surface of the High Plateau gravels, mark an earlier stage of Palæolithic culture than the River-drift stage of the Low Level gravels.

The fact that the implements in question occur only on the surface or a little below the surface of the former, while they are found in the undisturbed stratified deposits of the latter, proves in my opinion that they belong to the time of the accumulation of the latter, and that they are later than the time of the deposit of the former.

The materials out of which the implements have been fashioned, the colouring and the abrasion of their angles and edges, appear to me to be merely local accidents, and unimportant for purposes of classification. The River-drift hunter would naturally use the local materials, and the implements embedded in the surface of the clay-with-flints would naturally be stained. To my mind the whole series is of River-drift age, and represents one stage of human progress.

SERIES of IMPLEMENTS from Trenton, New Jersey, referable to the Red Indians, and illustrating the association of various types.

Group A. Indian Camping Ground.

Various implements and splinters, and finished articles, some of Palæolithic forms found on surface of plateau overlooking the river Delaware, and in association with Indian pottery. They are referable to the Delaware Indians.

Group B.

Implements found in sand of plateau, and of Palæolithic form.

Group C.

Implements from talus of old terrace of the Delaware, some of Palæolithic form.

This series of implements was obtained by me in 1880, when I spent three days in examining the district in company with Dr. Abbott, Dr. Putnam, Prof. Carvill Lewis, and Prof. Haynes. The sand in which Group B occurred seemed to me wind-drifted, and possibly rearranged in modern times.

For comparison with the above the two following specimens are exhibited:—

1. Quartzite "Teshoa," obtained by Dr. Leidy from a Shoshone squaw in Wyoming, who was using it on a hide. It is without any trace of man's handiwork.

2. Rude implement found in Soapstone Quarry worked by the Red Indians.

The question as to the existence of Palæolithic man in America depends upon the view which is taken as to the Palæolithic age of implements similar to those upon the table. Most of the observers—Abbott, Putnam, Lucien Carr, Haynes—who have studied the question on the spot, consider that the rude implements are found at such depths in the sands and gravels, as to indicate that they belong to the time of the deposit of the sands and gravels, and could not have been introduced afterwards. They view the similar implements upon the surface as having been denuded out of the strata below. If this be accepted, man lived in the area of Trenton at a time when the mastodon[1] was inhabiting the forests on the banks of the Delaware. Is it, however, quite certain that any of these implements have been found at Trenton under circumstances that would not admit of their being of later age than the sand and gravel? Looking at the evidence as to a similar deposit in

[1] A tusk was found in Trenton gravel, and is now in the museum in Brunswick City.

Minnesota, recently published by Mr. W. H. Holmes, in my opinion it is not certain. He points out that the uprooting of trees in a forest will disturb the superficial accumulation to a depth which will extend as far down as the larger roots. In this manner he satisfactorily accounts for the distribution of rude worked quartz fragments to a depth of 4 feet and more in the glacial deposits of Little Falls. (The "American Geologist," xi, 238.) This may have been the case at Trenton. The specimens obtained by me from the red sand did not occur under conditions which would render a later introduction impossible.

With regard to the specimens which came from a depth of many feet from the surface and in the gravel, Prof. Shaler is of opinion that they are not artificial, but the result of natural fracture. (The "American Geologist," xi, 183.)

On the other hand the presence of some of these implements in the old camping ground of the Indians along with ordinary Indian "shop refuse," opens up the possibility that the whole series of remains here, as at Little Falls, is really the *débris* of Indian camps. Until we have further evidence it is safe to put the Trenton rude implements to a "suspense account." The traces of Palæolithic man are, as Prof. Shaler observes, conspicuous by their absence from the caverns of Eastern North America, and from the fluviatile and lacustrine formations which contain hecatombs of the game which he would have hunted, had he been similar in his mode of life to the Palæolithic hunter in Europe.

The question of his absence or presence will have to be settled by other evidence than that of the rude form of his implements, and by a careful comparison with those of the Red Indian in America rather than with those of the River-drift man in Europe.

DISCUSSION.

Mr. J. ALLEN BROWN, while admitting the great interest of the paper, said he had not heard anything which led him to doubt the conclusions at which he had arrived, as expressed in his paper read before the Institute, to which Prof. Boyd Dawkins had referred; in fact, far from regarding the Professor's remarks as being antagonistic to his views, they appeared in several instances to confirm them. In the paper on the "Continuity of the Palæolithic and Neolithic Periods," he (the speaker) had endeavoured to show that there was a continuity of existence of man in N.W. Europe from the Plateau (or as he had suggested, the Eolithic) period to the latest division of the Stone age, and of course later. That this continuity is shown by the persistence of certain types of stone implements and by the evolution of the well known more

specialised Neolithic from the older generalised types, as well as by the evidence afforded of the gradual extinction of a few animals and the slow retreat of others.

The author's suggestion as to the Palæolithic implements from the Trenton gravels being possibly "Red Indian," he could not accept in the face of the deductions of Dr. C. Abbott and most other American geologists, but if he did so, it would only confirm his conclusions as to the persistence of some Palæolithic types in America into the latest Stone age—a continuity of form which was noticeable also in the series of native stone implements from Tasmania, recently exhibited by their late President, Dr. E. B. Tylor, accompanied with remarks of great interest and value.

It was almost unnecessary for him to say that roughness or rudeness of work was not in itself a test of age—skilled and unskilled workmen had always existed side by side, as shown in any large collection of Drift implements. It was evident from their geological position and forms that the rudely worked stones from Cresswell Crags were not of the same age as those well marked though rude implements from the Plateau Drift discovered by Mr. B. Harrison and described by Professor Prestwich.

As to general form or type there appeared to be indubitable evidence of the occurrence of dominant forms at different periods of the Stone age, and that while the later types were evolved from the earlier ones there were often survivals in later ages of older forms—as an illustration of this he called attention to the Palæolithic axe from which had gradually sprung, as shown by specimens on the table, the axes of intermediate form (Mesolithic) and the hatchets of the so-called Neolithic period.

He had never asserted that the flint implements from the mines of Cissbury were of the Palæolithic age, but had suggested that certain types of instruments survived into the period when those shafts were made, of whatever age they may be, and that such survivals of form indicated a continuity of occupation by man in this country though not necessarily by the same race. As an example of this he pointed to the large nodular pointed implement from Cissbury, on the table, which was chipped only at one end while the butt was unworked, the original crust of the nodule being preserved for comfortable use in the hand: an implement formed in this way being characteristic of the Drift period. The series of axe forms on the table appeared also to confirm his views as to the evolution of the axe which had first been shown by General Pitt Rivers in a series of lectures on "Primitive Warfare" in 1868.[1] Some of these specimens were of intermediate form, between the Drift types and those of Neolithic age, to which he had suggested that the term Mesolithic should be applied.

The flint implements alluded to in his paper on "Continuity" were not only obtained from the surface as mentioned by Professor B. Dawkins, but from chalk rubble and other deposits.

[1] "Journ. Roy. United Service Inst.," vol. xii, No. li.

There was not sufficient time in this discussion to review the most important part of the evidence, *i.e.*, that which was derived from cave deposits and rock shelters in England, France, and Belgium, referred to in his paper. Strong as was the testimony afforded by the English caves, the far richer material available to the French and Belgian geologists had brought forth overwhelming evidence in favour of his (the speaker's) conclusions, which had long since been admitted by many Continental geologists. It was sufficient to say here that he did not found his views on the French cave referred to by the author of the paper before them, or on any single cavern, but on the accumulated evidence of caves and rock shelter, &c., generally both in France and elsewhere.

As to the alleged break between the Palæolithic and so-called Neolithic periods—no physiographical or geological facts could be shown which would sustain such a theory—no cataclysmic or other action had ever been suggested which would produce such a hiatus. There was no evidence of a destructive disaster which included in its action Palæolithic man and spared the thirty-one species of mammalia which Professor Boyd Dawkins himself says survived into the Neolithic epoch, out of the forty-eight which lived in the Quaternary age—the remaining seventeen being accounted for by the migration of twelve and the extinction of five only.

Professor B. Dawkins would hardly say that the later insulation of this country, caused by the incoming of the sea over the land where is now the German Ocean, and the formation of the Straits of Dover, had anything to do with the alleged extinction of Palæolithic man in Britain, as the evidence for continuity of occupation, though not of race, was discernible on both sides of the Channel.

In considering the extinct and retreating fauna in N.W. Europe it should be remembered that there were only five extinct mammals. As the Professor had suggested the urus lived on into Neolithic times—the evidence of the survival of the reindeer in Scotland into that epoch, was strong—and the occurrence of the remains of the mammoth and some other Quaternary animals into the age of the peat-beds had been stated by eminent authorities—these slow changes had always occurred, and with the slow retreat and extinction of certain animals should be noticed the gradual increase of other Quaternary mammals in later Quaternary times: even in the historic period, the bear, wild boar, beaver and wolf had disappeared from this country—the destructive hand of man had been one of the factors in all these later changes, and the changing climate would account for the migration of other creatures: the sheep was a direct introduction from the east, probably in the earliest stage of the Bronze period, or late Stone age.

In conclusion, Mr. J. Allen Brown expressed his great satisfaction that the subject of his paper had been discussed at the Institute, and particularly that so distinguished a geologist as Professor Boyd Dawkins had given his views upon it, though he (the speaker) remained of the same opinion as he had before expressed, *i.e.*, that man had lived continuously in N.W. Europe from the most remote

period we know of, and that his advance in culture could be traced by the slow evolution and increased specialisation of his stone tools and weapons from the generalised primitive forms of the Eolithic (Plateau) and Drift periods into the later stages of the Stone age.

Professor Boyd Dawkins, in reply, said that Mr. Allen Brown had in his remarks confused continuity of *form* with continuity of *age*, and that there was no evidence in any part of the world of a continuity between the Palæolithic and Neolithic ages. There was a break, both zoological and geographical, between the two in Europe which Mr. Allen Brown had ignored.

Professor Boyd Dawkins had reserved in his paper the general question as to the derivation of the Neolithic culture from the Palæolithic in some part of the world. It had of course been so derived; but we had not yet discovered where that part is. It is probably not in Europe. With regard to the accumulation of flints in the valley bottoms, they were mostly derived from the decomposition of the chalk. In answer to Dr. Garson he stated that the chemical analysis of bones, in his opinion, was no test of age, their preservation being due to local and variable conditions. The calcareous skull he had studied at Harvard University. It is an ordinary Red Indian skull. A perforated disk of wampum in the inside is also ordinary Indian wampum. He doubted its high antiquity.

ANTHROPOLOGICAL MISCELLANEA AND NEW BOOKS.

An introduction to the Study of the Mammalia, living and extinct. By William Henry Flower, C.B., D.C.L., LL.D., F.R.S., &c., and Richard Lydekker, B.A., &c. (London: Adam and Charles Black, 1891.)

Man being, as regards his bodily structure, at least, essentially a member of the great group of mammalia, and subject to the same laws which govern the development and life history of the other members of the group, it is requisite that the anthropologist, in order to enable him to study his subject to advantage, should possess a knowledge of vertebrate anatomy generally, and especially of that of the mammalia. Hence the appearance of this new work on the mammalia by Sir William Flower and Mr. Lydekker has a special interest in relation to anthropology. The want of a modern English manual, treating not only of the skeleton and its modifications in the different living and extinct mammalia, but which also contains a description of the anatomical characters of the soft parts of the body, has been felt of recent years by anthropologists, and is, we think, now supplied by this work, so far as can be done within the limits of an introductory study of the mammalia.

In the first chapter the general characters of the mammalia, the development of their young, their size, and their uses and products are briefly described. The next chapter deals with their general anatomical characters, arranged under seven headings—namely, tegumentary structures, including the hair, colour, scales, nails, claws, hoofs, and odour-secreting glands; the dental system; the skeleton; the digestive system; the circulatory, absorbent, respiratory, and urinary systems; the nervous system and organs of sense; and lastly, the reproductive organs. Although the chapter extends to seventy-four pages, the description of these different systems of the body is as much condensed as possible. A desire to keep this part of the work within due limits probably accounts for the absence of any section on the developmental history of the mammal and its various systems, although a subject of the utmost importance in a general account of its anatomy, and necessary even to understand the description given subsequently; as, for example, we notice that two of the embryonic layers are referred to in the account of the development of the teeth, but, without a pre-

vious knowledge of general embryonal development, such references would not be intelligible to the reader. The authors have apparently presupposed such knowledge, and have also assumed some previous knowledge of vertebrate anatomy on his part, as we notice in the description of the thigh and leg the terms pre-axial and postaxial are used, without explanation, regarding the primitive and unmodified positions of the tibia and fibula.

The third chapter deals with the origin and classification of the mammalia. The view taken of their origin, namely, that they have all come from the same ancestral stock at the time the amphibian type was passing into the reptilian, will probably be accepted generally by zoologists, notwithstanding the diversity of opinions which exist as to details. The portion of the chapter dealing with the classification of the mammalia is very important, being the key to the arrangement of the subsequent part of the work. It is frankly admitted by the authors that all attempts to form a classification, embracing living as well as extinct specimens already known, must be of a temporary and provisional nature owing to the changes of ideas consequent upon our rapidly advancing knowledge of extinct forms. Whatever means may hereafter be taken to express the natural relationships of the various groups of the mammalia, it is certain that in systematic descriptions and catalogues, and probably also in the arrangements of specimens in museums, a linear series, though necessarily artificial and arbitrary, must ever be followed. The vast experience of Sir William Flower in museum work, as well as his universally admitted knowledge especially of this particular class of the animal kingdom, gives great weight to the arrangement which he here proposes, and to the reasons set forth which have led him to adopt it. Doubtless, as he states, "equally good reasons might be given for almost any other combination of the various elements of which the series is composed," but it may be assumed that the arrangement he has adopted is the outcome of much careful consideration of all sides of the question, as well as mature experience, and may therefore be accepted, without hesitation, as the most convenient classification for practical purposes, of this important class of animals. Adopting Huxley's three sub-classes of the mammalia of prototheria, metatheria, and eutheria, the prototheria are divided into the monotremata and a group of extinct animals termed multituberculata; the metatheria include one order, the marsupialia, and are subdivided into two sub-orders and twelve families. These sub-classes being well defined, give little trouble. It is to the arrangement of the different animals of the third sub-class, eutheria, that most people will look with interest. Space, however, prevents us from doing more than mention them in the order in which they are placed—namely, edentata, sirenia, cetacea, ungulata, rodentia, carnivora, insectivora, chiroptera, and primates.

The fourth chapter is devoted to the geographical and geological distribution of mammals. The division of the globe into six zoological regions proposed by Mr. P. L. Sclater has been

followed, and a sketch is given of the chief mammalian types characteristic of each. In dealing with the distribution of aquatic mammals, we are glad to observe that the "right" whale of the North Atlantic, *Balæna atlantica*, *B. australis* of the South Seas, and *B. japonica* of the North Pacific, all of which show no differences in anatomical structure or external appearances, are considered to be but one species and not three as they are usually made, for no better reason apparently than because they are found in regions of the ocean very widely separated. In regard to the appearance of mammals in geological time, the earliest date at which they are at present known to exist, is in the upper part of the Triassic period which forms the base of the Mesozoic epoch, these mammals, as we have seen, are placed with the sub-class prototheria, but it is not till the Eocene period of the Tertiary epoch that the earliest known eutheria are found, though probably in some part of the world they had made their appearance before that period.

In the fifth and succeeding chapters to the end of the book, the various orders of the mammalia are dealt with more in detail, the plan adopted being to give first a general description of the chief characters of each order, and then to deal with the families and genera which are included under it. In many instances also certain of the better known, or more interesting members of a group, are described at some length, while the others are treated with greater brevity. Readers of a journal devoted to anthropology, as this is, will naturally be most interested in the last chapter, which deals with the primates, and particularly with that part of it which treats of the family *Hominidæ*. For this reason we propose to devote the rest of our remarks to that section of the work.

The primates are divided into two sub-orders, the *Lemuroidea* and the *Anthropoidea*, the former consisting of the lemurs, tarsier, and aye-aye, while the latter includes the remaining members of the order—namely, those animals commonly known as marmosets, monkeys, baboons, and apes, together with man himself, and is divided into five families. The general description of the families of the *Anthropoidea* will be found extremely useful by anthropologists as containing a comparative survey of the anatomical characters of the group and the variations which occur in it. In treating of the families individually, the *Hapalidæ* and *Cebidæ*, which are confined in their geographical distribution to the New World, are dealt with more cursorily than the *Cercopithecidæ* and *Simiadæ* which contain better known species, and have special interest in relation to man, such as the baboons, gibbons, orang-utan, gorilla, and chimpanzee. In going through the higher forms of apes, one is painfully struck with the absence of extinct species, *Pliopithecus* and *Dryopithecus*, from the middle Miocene of France, and *Anthropopithecus sivalensis*, from the Pliocene of the Punjab, being the only representatives known to us. As the countries which are the habitats of the higher apes become

better known to us, it is sincerely to be hoped that some of the intermediate forms which have at one time existed will be discovered.

Since man differs from the apes most resembling him in bodily structure less than some of the other universally acknowledged members of the group do from one another, and as zoological classification has never taken into consideration the psychological characters of animals, but only their tangible and physical structure, he must be included amongst the primates. The authors consider the best exposition of the order as we now know it, is to regard man as representing a fifth family of the *Anthropoidea*, though this does not imply that such families are equivalent to one another, or that the intervals by which they are separated are of equal importance; all that the authors commit themselves to is that "there are five perfectly distinct groups, all branches from a common stem, and, in the present state of nature, not united by any intermediate types."

"The distinctions between the *Hominidæ* and the *Simiadæ* are chiefly relative, being greater size of brain and of brain-case as compared with the facial portion of the skull, smaller development of the canine teeth of the males, complete adaptation of the structure of the vertebral column to the vertical position, greater length of the lower as compared with the upper extremities, and greater length of the hallux with complete absence of the power of bringing it in opposition to the other four toes."

Man, as now universally admitted, is considered as a single genus, and reasons conclusive, to our mind, are adduced why he should be also considered a single species in the ordinary sense in which the word is now used, and all his different modifications regarded only as varieties or races, they never having been so far separated as not to be able to recombine and so answer to the physiological definition of species. There is ample proof to hand to show that vast antiquity must be assumed for man, during which he has been influenced by the operation of those natural laws which have produced the variations seen in other regions of organic nature. The first men may, very probably, have been all alike, but when spread over the earth and subject to diverse external conditions, racial differences began slowly to be developed. Geographical position and isolation must have been one of the chief elements in determining the formation and permanence of races, not only as regards their physical type but also their intellectual and moral qualities. "Thus for untold ages the history of man has represented a shifting kaleidoscopic scene; new races gradually becoming differentiated out of the old elements, and, after dwelling a while upon the earth, becoming suddenly annihilated or gradually merged into new combinations, a constant destruction and reconstruction, a tendency to separation and differentiation, and a tendency to combine again into a common uniformity."

The work concludes with a brief summary of the principal

results of the anthropological research on the varieties of the human species which have been attained up to the present, as set forth in his address as President of our Institute, and published in our Journal for May, 1885, by Sir William Flower.

J. G. G.

"**Alone with the Hairy Ainu,**" or 3,800 miles on a pack saddle in Yezo and a cruise to the Kurile Islands. By A. H. Savage Landor. (Murray.) 1893. 8vo. pp. 325.

Mr. Landor travelled during the whole of his journey of 4,200 miles alone, without friends, servants, or guides. The volume is profusely illustrated and contains much valuable information. An interesting series of flint arrow heads and knives are figured, the pit dwellers' habitations are described, and the customs of the inhabitants are very fully discussed.

"**A year amongst the Persians.**" Impressions as to the life, character, and thought of the people of Persia, received during twelve months' residence in that country in the years 1887–8. By E. G. Browne, M.A., M.B. (A. and C. Black.) 1893. 8vo. pp. 594. The author gives a valuable account of his journey in Persia, and the volume contains a large number of notes on various dialects met with. There is an important chapter on Mysticism, Metaphysic, and Magic.

"**Les Émules de Darwin.**" By A. de Quatrefages. (Paris, Germer Baillière.) 1894. 8vo. 2 vols. pp. 441. These volumes discuss the views of A. R. Russell, Naudin, Romanes, Carl Vogt, Filippi, Haeckel, Huxley, Owen, Mivart, Gubler and Koelliker, d'Omalius, d'Halloy, Erasmus Darwin and Quatrefages (by E. T. Hamy).

"**Typee.**" A narrative of a four months' residence among the natives of a valley of the Marquesas Islands, or a peep at Polynesian life. By Herman Melville. (John Murray.) 1893. 8vo. pp. 301. This edition of a work originally published in 1846, gives an excellent account of the islands described. It is well illustrated and has two maps.

"**Social life among the Assyrians and Babylonians.**" By A. H. Sayce. (R.T.S.) 1893. 8vo. pp. 126. The volume, one of the "By-paths of Bible Knowledge" series, gives a clear account of the people, their mode of life, education, marriage, and death; the market, the money lender, and the tenant; slavery and the agricultural labourer, trades and professions, and the religion of the people.

"**Forty-two years amongst the Indians and Eskimo.**" By Beatrice Batty. (R.T.S.) 8vo. 1893. pp. 223. The book contains details of the life of the Right Rev. J. Horden, first bishop of Moosonee, and describes, in a popular manner, life among the Indians and Eskimo of his diocese.

"**Scottish fairy and folk tales,**" selected and edited with an introduction by Sir George Douglas, Bart. (Walter Scott.) 1883. 8vo. pp. 301. The tales are divided into nursery stories, stories of animals, giants and monsters, legends and traditions, fairy tales, the brownie, the boggle, the kelpy, mermen, demons, witchcraft, apparitions, wraiths, the second sight, comic tales, literary tales.

"What, in conclusion, is there in these rude old wives' tales to justify their withdrawal from the limbo of forgotten things? They have a place, though it be a humble one, in the history of the workings of the human mind. They are the manifestation, in its simplest form, of the literary or poetic impulse, and nothing that has been thus generated, and that has stood the test of time, as these tales have done, can ever, I believe, be unworthy of our study."

"**The New Zealand Official Year book, 1893.**" (Government Press, Wellington.) 8vo. pp. 456. This contains a large amount of information with regard to the colony, with statistics as to the Maori population.

"**Customary Law.**" Abstract of the code of, for the Amritsar district. Vol. xi. By J. A. Grant. (Lahore, 1893.) pp. 16.

"**The Tshi-Speaking peoples** of the Gold coast of West Africa, their religion, manners, customs, laws, language, &c." By A. B. Ellis. (Chapman and Hall.) 1887. 8vo. pp. 343. The titles of the chapters are:—Religious Beliefs; General Deities; Srahmantin and Sasabonsum; Local Deities; Deities worshipped by particular sections of the community; the Tutelary Deities of Individuals; Deductions; the Priesthood; Psycholatry and Human Sacrifices; on Fetishism; Oaths, ordeals, omens, &c.; Family divisions and animal worship; Division of, and mode of reckoning time; Religious Ceremonies and Festivals; Ceremonies at birth, marriage, and death; State Ceremonies; System of Government; laws, language, music, traditions and folk-lore.

"**An Australian language** as spoken by the Awabakal, the people of Awaba or Lake Macquarie; being an account of their language, traditions, and customs." By L. E. Threlkeld. Edited by John Fraser. (Sydney: Government printer.) 1892. 8vo. pp. 148. "This volume is issued by the Government of New South Wales as a record of the language of native tribes that are rapidly disappearing from the coasts of Eastern Australia . . . In all New South Wales there are only 5,000 full-blood blacks; only 400 or 500 in Victoria: and in Tasmania the native race became extinct in 1876." The grammar and vocabulary of the Awabakal, Minyung, Narrinyeri, Wiradhari, and Kamalari dialects are given. The volume contains an excellent map of the approximate limits of the various tribes.

"**Icelandic pictures** drawn with pen and pencil." By F. W. W. Howell. (R.T.S.) 1893. 4to. pp. 176. A reliable description of a ride through the island, with excellent illustrations.

"La route du Tchad." From Loango to Chari. By Jean Dybouski. (Paris: Firmin Didot.) 1893. 4to. pp. 381. Map. The volume is well illustrated, with a large number of drawings of natives, weapons, &c.

"The South Sea Islanders and the Queensland labour trade. A record of voyages and experiences in the Western Pacific from 1875 to 1891." By W. T. Wawn (Master Mariner). (Swan Sonnenschein.) 1893. 8vo. pp. 440. Illustrated. "Captain Wawn was engaged in recruiting such labourers (Kanakas) from 1875, when they were first introduced, down to 1891, when the Queensland Government legislated against the importation of Kanakas into the colony, and their employment there."

"Transactions of the New Zealand Institute, 1892." Vol. xxv. N.S. Maori nomenclature, by T. H. Smith. Unwritten literature, by R. C. Harding. Notes on some bone combs for dressing the head of a Maori chief, by A. Hamilton. Notes on some old flax mats found in Otago, by A. Hamilton. Discovery of Maori implements at Takaka, Nelson, by R. T. Kingsley.

"Journal of the Anthropological Society of Bombay." Vol. iii. No. 1. Burial customs among the Bhuinhâr Brahmans in the Sâran district, Behar by S. C. Mitra. On some ceremonies for producing rain, by S. C. Mitra. The book for taking omens from snakes, by J. J. Modi. Indian folk-beliefs about the tiger, by S. C. Mitra. Caste measurement tables. An interesting Vedic ceremony. No. 2. Progress of Anthropology in India, by H. H. Risley. Notes on two Behari pastimes, by Sarat Chandra Mitra. Name-giving ceremony on a new-born child, by T. M. Nathubhai. Some curious customs among the Kochs, by K. Basu. A wild boy and girl, by S. C. Mitra. Caste measurement tables.

"The American Antiquarian." Vol. xv. No. 5. Commemorative columns and ancestor worship, by S. D. Peet. (Illustrated.) Totem posts at the World's Fair, by J. Deans. No. 6. Personal divinities and culture heroes of the uncivilized races, by S. D. Peet. (Illustrated.) South American Archæology at the World's Fair, by G. A. Dorsey. On the words "Anahuac" and "Nahuatl," by D. G. Brinton.

"The Scottish Geographical Magazine." Vol. ix. No. 12. The races of Trans-Caucasia, by V. Dingelstedt.

"Revue L'Anthropologie." Vol. iv. No. 4. (1893.) The Agni, a W. African race (Pai-pi-bri). By Maurice Delafosse.

"Fifth Annual Report of the Canadian Institute." 1892-3. (Toronto Ministry of Education.) Catalogue (illustrated) of specimens exhibited at the Columbian Exposition, Chicago.